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ABSTRACT

This effort compares the graduates of the three types of Registered Nurse (RN) education programs (three-year Diploma in Nursing, two-year Associate Degree in Nursing (ADN), and four-year Bachelor of Science Degree in Nursing). The basic objective is to determine whether they are perfect substitutes, especially whether ADN graduates can adequately replace diploma graduates as the base of the profession. The measurement of the performance of the RNs is indirect. The job market outcomes for RNs of different educational backgrounds reveal the implicit evaluations by employers of RNs. Regressions of the probability of employment in various nursing jobs as a function of RN education, work experience, and various personal characteristics are used for this analysis. The RN wage structure is also examined to determine whether there is consistent wage differentiation between the various RN preparations. The data were developed through a mail survey of a random sample of California resident RNs. A response rate of about 80 percent was obtained with three mailings, yielding 942 employed RNs for the analysis. Conclusions are that ADN graduate and diploma graduate RNs are indistinguishable; they are paid the same wage, and their job distribution is the same when work experience is controlled. However, diploma graduate RNs cannot substitute for BSN graduate RNs. They are paid similar wages when job area is controlled, but their distribution among job areas is markedly different. (Author)

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Registered Nurse Education and the Registered Nurse Job Market

By

Howard Allan Hunt

B.S. (University of Wisconsin) 1964
M.S. (Lehigh University, Bethlehem, Pennsylvania) 1966

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Economics

in the

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ABSTRACT

This effort compares the graduates of the three types of Registered Nurse (RN) education programs (three-year Diploma in Nursing, two-year Associate Degree in Nursing, and four-year Bachelor of Science Degree in Nursing). The basic thrust is to determine whether they are perfect substitutes, especially whether ADN graduates can adequately replace Diploma graduates as the base of the profession.

The measurement of the performance of the RNs is indirect. The job market outcomes for RNs of different educational backgrounds reveal the implicit evaluations by employers of RNs. A two-equation model is used with the first equation expressing the hourly wage as a function of job variables such as the location, the sector of nursing practice, the job title, type and size of employer and others along with years of seniority and type of RN education of the job occupant. This wage equation tests for the presence of systematic wage differentials by education within job categories.

The second equation gives the probability of employment in various nursing jobs as a function of RN education, years of work experience and other personal characteristics. This distribution equation is estimated for eight broad sectors of nursing practice and for four job titles within the hospital sector. It is maintained that if employers of RNs see the three educational types as identical in performance, the probability of employment in given sectors will be the same.

The data were developed through a mail survey of a random sample of California resident RNs. A response rate of about 80% was obtained with three mailings, yielding 942 employed RNs for the analysis. Results for the wage equation show there are no statistically significant differences between the wages of Diploma, ADN and BSN educated RNs when job variables are controlled. There is no formal differentiation in wages within job categories.

The distribution results, however, show that BSN trained RNs are significantly different from Diploma grads. They are less likely to be employed in nursing education, school nursing, and public health nursing. Within the hospital sector, BSN grads are significantly less likely to be staff nurses and more likely to be supervisors and to hold positions outside the formal line of command. The conclusion is that Diploma graduate RNs are not perceived by employers of RNs as perfect substitutes for BSN graduates.

On the other hand, no statistically significant differences are found in the distribution of Diploma and ADN trained RNs. Their probability of employment in each of the eight sectors and in all four positions within the hospital sector is the same. Since employers do not differentiate between ADN and Diploma educated RNs, it is concluded that they are perfect substitutes. Therefore, fears that ADN trained RNs cannot adequately replace Diploma RNs are misplaced.

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My first debt is to my wife, Roberta, who not only offered considerably more than the usual support and encouragement but who has been my partner throughout all phases of the study. She first drew my attention to the question of Registered Nurse education and provided an invaluable source of institutional knowledge of nursing throughout the investigation. I also owe a great deal to Professor Lloyd Ulman who encouraged me to broaden the inquiry to make it policy-relevant. Professor Ulman also sponsored my application for a Manpower Dissertation Grant, without which this project could not have been undertaken, and as Director of the Institute of Industrial Relations at Berkeley, he provided a "home" which greatly enhanced the overall success of the investigation.

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TABLE OF CONTENTS

		PAGE
ACKNOWLEDGEMENTS		vi
LIST OF FIGURES		ix
LIST OF TABLES		x
CHAPTER		
I	INTRODUCTION	1
II	RN SUPPLY AND DEMAND: THEORETICAL CONSIDERATIONS	13
	DEMAND FOR RNs	15
	Market Imperfections: (1) Nonprofit Firms	17
	Market Imperfections: (2) Monopsony Power	38
	SUPPLY OF RNs	43
	CONCLUSION	50
III	DATA	51
IV	RN WAGE STRUCTURE - BIVARIATE RESULTS	62
V	RN WAGE STRUCTURE - MULTIVARIATE RESULTS	84
VI	THE SECTORAL DISTRIBUTION OF RNs	105
VII	SOME EXTENSIONS AND ELABORATIONS	152
	SECTORAL RESULTS WITH A TRUNCATED EXPERIENCE DISTRIBUTION	152
	ANALYSIS OF POSITION DISTRIBUTION IN THE HOSPITAL SECTOR	164
	THE HOURLY WAGE BY INDIVIDUAL CHARACTERISTICS	185
VIII	SUMMARY AND CONCLUSIONS	193
APPENDIX		200
BIBLIOGRAPHY		212

LIST OF FIGURES

FIGURE		PAGE
1	GRADUATIONS - RN INITIAL PROGRAMS, U.S. and Outlying Areas, 1956-1972	4
2	GRADUATIONS - RN INITIAL PROGRAMS, California, 1956-1972	8
3	MONOPSONY MARKET MODEL	40

LIST OF TABLES

TABLE		PAGE
2-1	SECTOR OF EMPLOYMENT OF REGISTERED NURSES, California, May, 1970	16
2-2	RN EMPLOYMENT IN CALIFORNIA HOSPITALS, 1968 . . .	18
2-3	MANPOWER INPUT ON INPATIENT UNITS BY OWNERSHIP, California Short-term Hospitals	26
2-4	MANPOWER INPUT ON INPATIENT UNITS BY OWNERSHIP AND SIZE, California Short-term Hospitals	29
2-5	ESTIMATED CHANGES IN HEALTH MANPOWER DEMAND ON INPATIENT UNITS UNDER "EFFICIENT" CONDITIONS, California Voluntary and Proprietary Hospitals With Less Than 200 Beds, May, 1968	35
2-6	PROPORTION OF RN INPUT BY RN EDUCATION BY OWNERSHIP OF HOSPITAL, RNs Working in Hospitals Only	37
3-1	SURVEY RESPONSE INFORMATION	53
3-2	SUMMARY SAMPLE DESCRIPTION	55
3-3	VARIABLES AVAILABLE FROM SURVEY	60
4-1	MEAN WAGE BY LOCAL LABOR MARKETS	65
4-2	MEAN WAGE BY EMPLOYMENT SECTOR	70
4-3	MEAN WAGE BY POSITION	75
4-4	MEAN WAGE BY EMPLOYER TYPE	78
4-5	MEAN WAGE BY EMPLOYER SIZE	78
4-6	MEAN WAGE BY RN EDUCATION	80
4-7	WORK EXPERIENCE BY RNED	82
5-1	REGRESSION OF LOG OF HOURLY WAGE ON JOB CHARACTERISTICS	88

LIST OF TABLES
(continued)

TABLE		PAGE
5-2	EFFECT OF YEARS OF SENIORITY ON HOURLY WAGE . . .	93
5-3	REGRESSION OF LOG OF HOURLY WAGE ON JOB CHARACTERISTICS FOR HOSPITAL SECTOR	98
5-4	REGRESSION OF LOG OF HOURLY WAGE ON JOB CHARACTERISTICS FOR HOSPITAL STAFF NURSE	102
6-1	EMPLOYMENT SECTOR BY RN EDUCATION	106
6-2	PROBABILITY OF EMPLOYMENT IN HOSPITAL, Probit Regression	113
6-3	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN HOSPITAL, From Probit Regression	127
6-4(a)	PROBABILITY OF EMPLOYMENT IN NURSING HOME, Probit Regression	129
6-4(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN NURSING HOME, From Probit Regression	130
6-5(a)	PROBABILITY OF EMPLOYMENT IN CLINIC, Probit Regression	132
6-5(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN CLINIC, From Probit Regression	133
6-6(a)	PROBABILITY OF EMPLOYMENT IN OFFICE NURSING, Probit Regression	135
6-6(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN OFFICE NURSING, From Probit Regression	136
6-7(a)	PROBABILITY OF EMPLOYMENT IN NURSING EDUCATION, Probit Regression	138

LIST OF TABLES
(continued)

TABLE		PAGE
6-7(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN NURSING EDUCATION, From Probit Regression	139
6-8(a)	PROBABILITY OF EMPLOYMENT IN SCHOOL NURSING, Probit Regression	141
6-8(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN SCHOOL NURSING, From Probit Regression	142
6-9(a)	PROBABILITY OF EMPLOYMENT IN PUBLIC HEALTH, Probit Regression	144
6-9(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN PUBLIC HEALTH, From Probit Regression	145
6-10(a)	PROBABILITY OF EMPLOYMENT IN OTHER NURSING SECTORS, Probit Regression	147
6-10(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN OTHER NURSING SECTORS, From Probit Regression	148
7-1	PROBABILITY OF EMPLOYMENT IN HOSPITAL FOR RNs WITH TEN YEARS EXPERIENCE OR LESS, Probit Regression	155
7-2	PROBABILITY OF EMPLOYMENT IN NURSING HOME FOR FOR RNs WITH TEN YEARS EXPERIENCE OR LESS, Probit Regression	158
7-3	PROBABILITY OF EMPLOYMENT IN CLINIC FOR RNs WITH TEN YEARS EXPERIENCE OR LESS, Probit Regression	159
7-4	PROBABILITY OF EMPLOYMENT IN OFFICE NURSING FOR RNs WITH TEN YEARS EXPERIENCE OR LESS, Probit Regression	160

LIST OF TABLES
(continued)

TABLE		PAGE
7-5	PROBABILITY OF EMPLOYMENT IN PUBLIC HEALTH FOR RNs WITH TEN YEARS EXPERIENCE OR LESS, Probit Regression	162
7-6	POSITION BY RN EDUCATION: EMPLOYMENT SECTOR IS HOSPITAL	165
7-7(a)	CONDITIONAL PROBABILITY POSITION IS STAFF GIVEN EMPLOYMENT SECTOR IS HOSPITAL, Probit Regression	170
7-7(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY POSITION IS STAFF NURSE GIVEN EMPLOYMENT SECTOR IS HOSPITAL, From Probit Regression	171
7-8(a)	CONDITIONAL PROBABILITY POSITION IS HEAD NURSE GIVEN EMPLOYMENT SECTOR IS HOSPITAL, Probit Regression	175
7-8(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY POSITION IS HEAD NURSE GIVEN EMPLOYMENT SECTOR IS HOSPITAL, From Probit Regression	176
7-9(a)	CONDITIONAL PROBABILITY POSITION IS SUPERVISOR GIVEN EMPLOYMENT SECTOR IS HOSPITAL, Probit Regression	178
7-9(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY POSITION IS SUPERVISOR GIVEN EMPLOYMENT SECTOR IS HOSPITAL, From Probit Regression	179
7-10(a)	CONDITIONAL PROBABILITY POSITION IS OTHER GIVEN EMPLOYMENT SECTOR IS HOSPITAL, Probit Regression	182
7-10(b)	ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY POSITION IS OTHER GIVEN EMPLOYMENT SECTOR IS HOSPITAL, From Probit Regression	183
7-11	REDUCED FORM WAGE EQUATION REGRESSION OF LOG OF HOURLY WAGE ON PERSONAL CHARACTERISTICS	189

Chapter I

INTRODUCTION

An individual desiring to become a Registered Nurse (RN) today is faced with a rather confusing array of possibilities. She (or he) can seek out a hospital affiliated school of nursing, a Diploma program (DIP), where her studies will consume three years; she can go to a college or university offering a Bachelor of Science Degree in Nursing (BSN), a program of study taking four or five years; or she can go to a community college which offers an Associate Degree in Nursing (ADN), generally requiring two years.[1] In each case, upon the successful completion of the course of study the student is eligible to sit for the licensure examination administered by the state. If she passes, she is a Registered Nurse.[2]

The contrasts among the three types of RN education programs are considerable.[3] The length has been mentioned; this clearly is

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[1]We will refer to RNs as female for convenience even though some two percent are in fact male.

[2]As we shall see, the question of whether they are in fact the same once they have passed the examination is at the heart of this inquiry.

[3]See Nurse Training Act of 1964: Program Review Report (Washington, D.C.: U.S. Department of Health, Education, and Welfare, Public Health Service, PHS Publication No. 1740, 1967), pp. 19-21 for a brief discription of the educational philosophies of these programs. It should be realized that there is some variance within each program type also, especially across different states. The writer's familiarity is limited to the California situation and the reader should be warned that local conditions may vary.

the most important factor since the opportunity costs (foregone earnings) are usually the largest single cost item in human capital investment; the time invested is also of obvious value to the individual. There are differences in direct costs as well. Altman reports that the average annual direct investment costs for the 1968-69 school year were $615 for Diploma (DIP) programs, $1003 for Baccalaureate (BSN) programs, and $610 for Associate Degree (ADN) programs.[4] It is easily seen that the total costs of the programs vary enormously, from $1220 plus two years foregone earnings to $4012 plus four or more years foregone earnings. Accompanying the differences in site of training are differences in life style as well. Diploma schools that are hospital controlled usually provide a dormitory for student nurses that is a part of the hospital complex. The students live near the hospital with other nursing students. Nursing is designed to occupy the center stage in their lives. ADN and BSN students can live virtually the same kind of life as other college students. This covers everything from coeducational opportunities to choices in life style, including the possibility of living at home and thereby lessening the apparent cost of training.

In addition, since the Diploma schools lie outside the mainstream of higher education, there is a much greater difficulty in securing transfer of academic work should the student decide to further her education, transfer from one program to another, or

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[4]Stuart H. Altman, Present and Future Supply of Registered Nurses (Washington, D.C.: U.S. Department of Health, Education, and Welfare, DHEW Publication Number (NIH) 72-134, November, 1971), p. 52.

indeed leave nursing training entirely. In human capital terms, this makes the training in Diploma programs less general and hence less valuable to the student.[5]

There has been considerable expansion in the number of graduates from RN initial programs (i.e., the individual's first training as an RN) over the last fifteen years. However the trends for the three different types of programs vary enormously. Figure 1 shows that graduations from Diploma programs have actually declined in recent years. This is the traditional method of training nurses and generally follows an apprenticeship pattern with the student nurse spending her time in large part learning by doing. In recent years, under the spur of the National League Nursing (NLN) accreditation demands, there has been a move toward more classroom instruction and less time spent "in practice."[6] This development is very much a part of the debate over RN education which we shall discuss shortly. There has also been some tendency to shorten the programs as a means of "meeting the competition" from the Associate Degree programs.

The Baccalaureate programs were founded rather early (shortly after 1900), but only began to become important in the supply of RNs after World War II. The main curricular distinction of the BSN programs is the inclusion of some or all of the normal under-

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[5]See Altman, pp. 65-76 for an excellent theoretical discussion of the RN training market using the human capital framework.

[6]See Thomas Hale, "Problems of Supply and Demand in the Education of Nurses," New England Journal of Medicine, 275:1044-48, November 10, 1966, for an unsympathetic discussion of this process.

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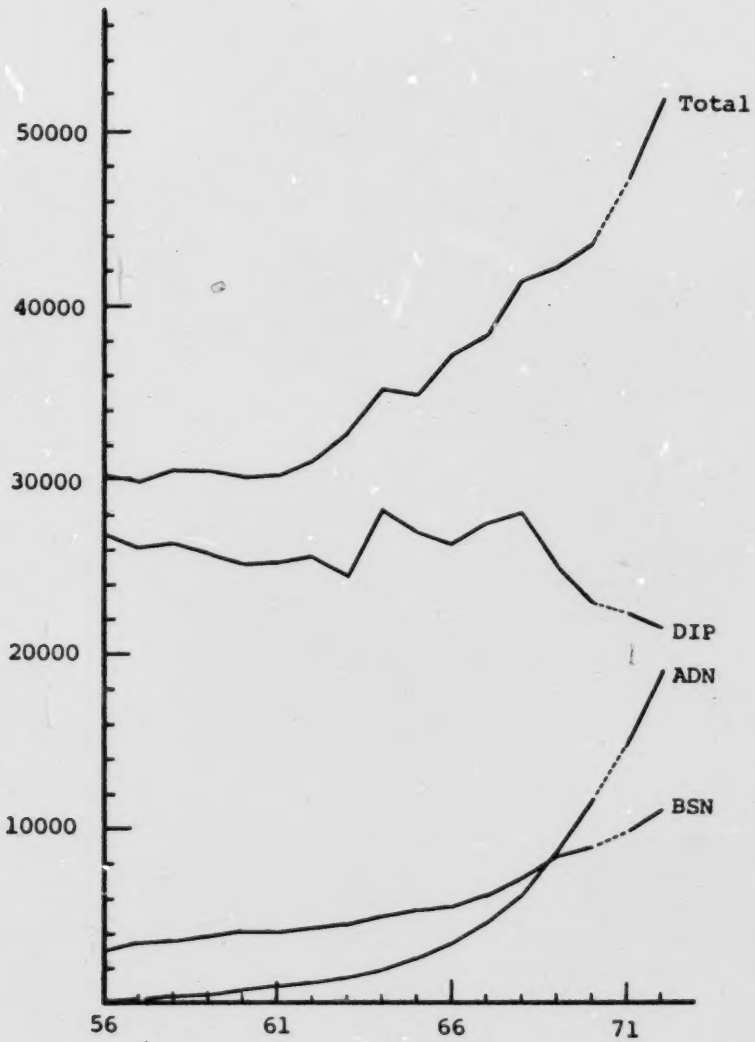
Figure 1

GRADUATIONS - RN INITIAL PROGRAMS
U.S. and Outlying Areas
1956 - 1972



Source: ANA, Facts About Nursing, various years; 1971 and 1972 from Nursing Outlook, September, 1973.

graduate core material. Some programs encompass two years "pre-nursing" which would resemble other lower division programs but with particular attention to anatomy, physiology, biology and chemistry. This is then followed by three years of nursing education per se. Other programs integrate the two to a greater extent and, omitting many electives, usher the student through in four academic years, sometimes with summers.

There is no legal distinction made between RNs on the basis of education, but most BSN curricula include the theory and practice of public health nursing. In some states there is separate certification required for practice as a public health nurse, thus BSN grads whose programs included public health nursing are so certified upon application. Others must undergo additional training, which will frequently not be available to those not regularly enrolled in a Baccalaureate program. Because of the general desirability of public health nurse positions (greater independence, better hours, better pay) and the fact that a Bachelor's Degree is more and more regarded as minimum preparation for nursing faculty positions, there should be a clear distinction in informed students' minds between BSN programs and the other two. Figure 1 shows there has been a steady but unspectacular growth in BSN graduations over the last fifteen years.

The dynamic sector of Registered Nurse education has been the Associate Degree programs (ADN) in the community colleges. This sector has grown from its origin in the early 1950's to well over one-third of graduates currently. One of the most influential people in this movement has been Mildred Montag at Columbia Univeristy. She advocated the extinction of the traditional Diploma

training program, largely on the grounds that the programs were work-centered rather than education-centered. They were to be replaced with programs for the education of a new "nurse technician" in the community colleges.[7]

It should be clear from the sketches presented earlier why students would prefer these ADN programs. The indirect costs are lower, due to the shortened length of the period of investment, the training is more general than Diploma training so the risk is less, and the sacrifices in life style are not so onerous.

The nursing profession (or at least some of its leadership) finds a number of aspects of the ADN programs attractive. They credit the resurgence in RN program enrollments in part to the greater attractiveness of student life in ADN programs. They also generally feel it is more prestigious to have their professional education located in colleges and universities like the other professions. The shifting of the locale of professional education to the colleges offers a number of practical advantages as well. Control over the educational programs will pass to the profession and out of the hands of hospital authorities, yielding significant gains in independence and self-direction. Access to public funding is another significant advantage long denied to the nursing profession which arises spontaneously with a shift into the community colleges. The providers, community colleges, were also delighted to find a ready clientele looking for service, especially in a semi-professional, terminal program with a socially valued product

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[7]Mildred L. Montag, The Education of Nursing Technicians (New York: G. P. Putman's Sons, 1951).

widely thought to be in short supply. However, the growth in ADN programs has been very uneven among the various states, reflecting the level of development of the community college system in each state.

California, with its already existing community college system, found it particularly easy to extend the training of Registered Nurses into those colleges very rapidly. Up until 1966, California was providing about one-third of the national total of ADN graduates as compared with California's share of about one-twentieth of all RN graduates. And while the U.S. total of ADN graduates probably passed the DIP total for the first time in 1973, this mark was achieved in California in 1964. Figure 2 shows that in 1972, ADN graduates were nearly seventy percent of the total in California. If the future promises the total replacement of the Diploma programs by Associate Degree programs as some nursing leaders hope, California is nearest that goal. Correspondingly, California is the best place to evaluate this trend.

The question of the best method of educating Registered Nurses has been a matter of hot dispute since the American Nurses' Association (ANA) published their famous position paper in 1965. "The education for all those who are licensed to practice nursing should take place in institutions of higher education."[8] It should be pointed out that "institutions of higher education" do not include Diploma schools of nursing. They do include both two-year and four-year colleges however. The impact of the position paper in urging

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[8]American Nurses Association, "Position on Education for Nursing," American Journal of Nursing, 65:107, December, 1965.

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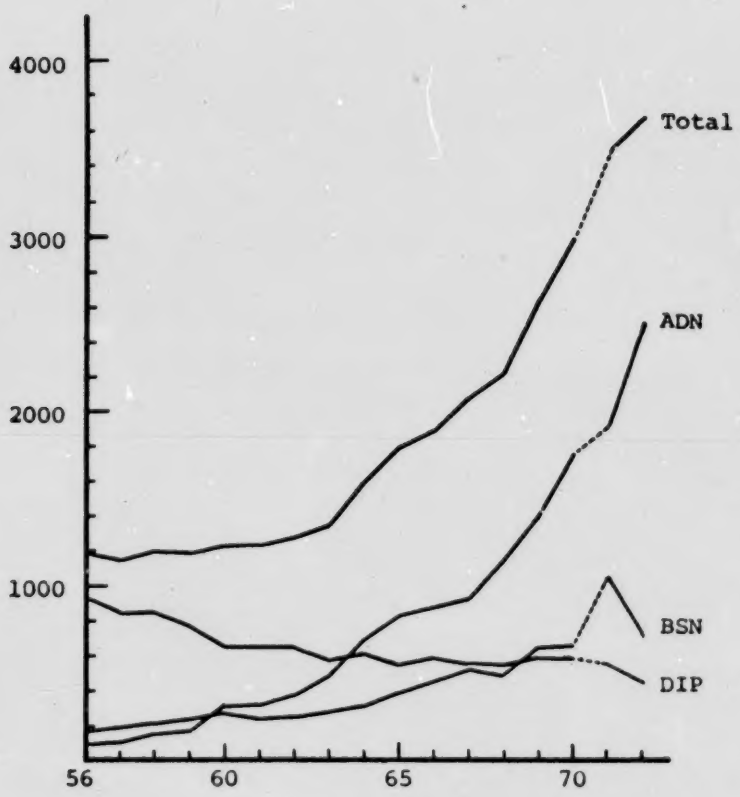
Figure 2
GRADUATIONS - RN INITIAL PROGRAMS
California
1956 - 1972



Source: ANA, Facts About Nursing, various years; 1971 and 1972 from the California Board of Nursing Education and Nurse Registration.

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the extinction of the hospital school of nursing (DIP) can be appreciated when it is contrasted with the fact that seventy-seven percent of the initial graduations in nursing in 1964-65 were from hospital-affiliated Diploma programs; an even higher proportion of the existing stock of practicing RNs trained in Diploma programs since the proportion of new graduates accounted for by Diploma programs has been declining for some time.

Virtually every issue of any nursing journal in the late 1960's contained some contribution to the continuing debate over the merits or demerits of these developments. The debate centered around the issue of whether functionally adequate RNs could be prepared in two years, especially given the marked reduction in nursing practice in the ADN programs. Proponents of ADN programs emphasized the theoretical content of nursing and maintained that specific skills are quickly picked up on the job after graduation. Opponents stressed the practical demands of nursing and asserted that ADN graduates were not competent upon graduation.[9] Nor has the debate been confined to the nursing profession. The American Medical Association and the American Hospital Association both have seen fit to take the part of the hospital-based Diploma programs and in opposition to the "nurse educationist" position of the ANA.[10]

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[9]One of the clearest statements of the differences between the two sides can be found in Laura Dustan and Thomas Hale, "The Iowa Debate: Education for Nursing: Apprenticeship or Academic? Wanted: Nurses to Nurse Patients," Nursing Outlook, 15:26-32, September, 1967.

[10]See AMA, "Resolution to Urge Increases in Diploma Students of Nursing," American Journal of Nursing, 67:1393, August, 1967; "The Nursing Education Controversy: AHA Acts to Support Hospital Schools," Hospitals, 41:22a-22c, June 1, 1967; and "Administrators Speak Out on the Role and Future of Hospital Schools of Nursing," Modern Hospital, 109:95-96, 103-105, August, 1967.

More recently the National Commission for the Study of Nursing and Nursing Education (Lysaught Commission), a privately funded study group, spent two and one-half years on an overview of nursing. With a somewhat more even-handed approach, they nevertheless ended up basically in support of the ANA position.

> For all these reasons, then -- societal expectation, the attitude of students, the growing availability of alternatives, and the measured outcomes of the programs -- we believe that the future pattern of nursing education should be developed within the framework of our institutions of higher education.[11]

It is the "measured outcomes" (i.e., the output or the product) of the three types of programs that should, when combined with the costs of producing that output, determine which way of preparing RNs is preferred. But how are we to measure the output of these educational programs? That is, how are we to measure the performance of the RNs that graduate from these programs? The measured outcome referred to in the Lysaught Report was a special analysis of the results of the Registered Nurse licensure examination administered in New York State in July, 1968. The Commission was able to compare the school mean scores for all the RN training programs in New York, thus making comparisons among Diploma, Associate Degree, and Baccalaureate program results possible.

> . . . the associate degree students placed lower on the average on each area of examination, but notice also that the diploma students scored lower on the average than did the baccalaureate students. The most outstanding feature of the scores is the large overlap among all three programs. The indication is that variation in scores within one type of program is as great as variation between the three types of programs.[12]

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[11] An Abstract for Action (New York: McGraw-Hill, 1970), p. 107.

[12] Ibid.

Thus the Commission concluded that popular conceptions about the capability of graduates of the three types of program were probably overdrawn.

While the licensure examination does legally determine who is entitled to practice nursing, there are obvious problems, recognized in the nursing literature, with using scores on a written exam to measure nursing performance. It would clearly be preferable to measure nursing adequacy more directly. This would best be done by comparing the performance of an individual practitioner to the ideal performance. However, concensus on a scale to measure nursing performance is still beyond the reach of the profession.[13]

Nevertheless, there is a way of approaching the problem of comparisons among RNs without having to deal explicitly with the problem of defining a good nurse or an optimal nursing performance. The wages paid to RNs of different educational backgrounds can tell us the value the market places on the skills of the variously prepared practitioners. Thus the evaluation of performance is done by the employers of RNs. Their preferences are registered as "dollar votes" in the RN labor market and the resulting market wages reflect the concensus of employers as to the relative merits of the product of each type of RN education.

The goal of this effort is to apply this principle to the problem of comparing the three types of RN. This will consist of an attempt to develop empirically the connections between the type of

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[13]See for example A Method of Rating the Proficiency of the Hospital General Staff Nurse (New York: NLN, 1964) and Elaine Dyer, Nurse Performance Description: Criteria, Predictions and Correlates (Salt Lake City: University of Utah Press, 1967).

RN education and the subsequent experience in the job market. We will examine the effect of RN education on the wage earned, the sector of employment, and the position held. The basic question is whether the three types of RN are perfect substitutes for each other, i.e., indistinguishable in practice.

We will test this first with the null hypotheses that RNs in given job areas are paid the same wage regardless of their education:

H_o : $W_{ij} = k_j$ for all j and for i = ADN, DIP and BSN

where

W_{ij} = wage paid in job area j to RNs trained in program i (i = ADN, DIP, or BSN)

k_j = constant for each job area.

Secondly, we will test the null hypotheses that the probabilities of working in given job areas are the same regardless of RN education:

H_o : $p_{ij} = c_j$ for all j and for i = ADN, DIP and BSN

where

p_{ij} = the probability an RN trained in program i will be working in job area j (i = ADN, DIP, or BSN)

c_j = constant for each job area.[14]

Last, we will test the hypothesis that there are no differences in the average wages for ADN, DIP, or BSN graduates (without regard to job area):

H_o : $W_{ADN} = W_{DIP} = W_{BSN}$.

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[14]We will use p throughout to represent probabilities.

The conclusions here are simple: if the three types of RN are paid the same wages, and their distribution shows they are substitutes in all applications, they are one factor of production, not three. Therefore, the least expensive way of training them is to be preferred.

Chapter II

RN SUPPLY AND DEMAND: THEORETICAL CONSIDERATIONS

In a perfectly competitive neoclassical world, one can safely make calculations about productivity using wages and prices appearing in the various markets of such an economy. In particular, if there are three types of RNs available in the economy and three different wages are observed, one for each type, we can confidently assert that the wages measure the marginal product of the three types of RNs and that we can assess the relative contribution to aggregate output of each by reference solely to the wage. Since the social value of employing a given type of nurse is thus measured by the wage, we need only find the social cost of producing each type of nurse to decide which way is most efficient. This of course assumes that the three types of RN are good substitutes in all, or nearly all, applications.

This conclusion from general equilibrium analysis is not only the result of the perfect structure of all markets in a neoclassical world, but also of the firms' behavioral rule of profit maximization. Firms find that the profit maximizing condition for inputs is:

$$\frac{MRP_i}{W_i} = k \quad \text{for all } i,$$

where MRP_i represents the marginal revenue produced by, and W_i repre-

sents the marginal cost to the firm of employing, one additional unit of the i-th input. In particular, employers of RNs should seek to achieve the condition:

$$\frac{MRP_{ADN}}{W_{ADN}} = \frac{MRP_{DIP}}{W_{DIP}} = \frac{MRP_{BSN}}{W_{BSN}} .$$

The results of these efforts, expressed as bids for the various types of RN on a competitive labor market, will be three wages expressing in monetary terms the marginal contributions that the three types of RNs make to the output of the employers of RNs. If the three inputs are perfect substitutes for each other, i.e., their marginal products are identical, the wage paid to each will be the same. How reasonable is it to apply this theoretical analysis to the evaluation of RN education, using RN wages observed in the real world, with all the imperfections and distortions that it implies? The answer to this question cannot be given without a careful inspection of the actual structure of the market for Registered Nurses.

DEMAND FOR RNs

Registered Nurses are employed in a variety of institutions. After hospitals, which employed 61% of working RNs, no other sector took as much as ten percent of the supply in California in 1970. It can also be seen from Table 2-1 that the bulk of nurses are employed by nonprofit organizations. Lumping together office nurses (who work for individual physicians or group practices - widely thought to be profit maximizing operators), industrial nurses, private duty nurses (self-employed), convalescent nursing homes (largely proprietary) and the small proportion of hospitals which are proprietary, the total does not exceed one-third of employed RNs. So two-thirds or more are employed by non-profit, private, or government organizations.

Another way of looking at the employment of RNs would be in terms of wage linkages. It is generally felt that public health nurses, school nurses, and industrial nurses are linked more closely to other public employees, teachers, and industrial workers respectively in terms of salary levels and movements and hence, these sectors can be regarded as separate markets somewhat insulated from the other sectors.[15] Schools of nursing and Federal Government employees may have similar "outside" linkages. But for the over eighty percent of total RN employment in California remaining,

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[15]See Donald Yett, "Causes and Consequences of Salary Differentials in Nursing," Inquiry, 7:84-88, March, 1970 for the development of this notion.

Table 2-1

SECTOR OF EMPLOYMENT OF REGISTERED NURSES
California, May, 1970

SECTOR OF EMPLOYMENT	NUMBER	PERCENT
HOSPITALS & OTHER INSTITUTIONS	12321	61.1
CONVALESCENT NURSING HOMES	1312	6.5
SCHOOLS OF NURSING	437	2.2
PRIVATE DUTY NURSES	610	3.0
PUBLIC HEALTH	920	4.6
SCHOOL NURSING	929	4.6
INDUSTRIAL NURSING	465	2.3
OFFICE NURSING	1661	8.2
CLINIC NURSING	475	2.4
FEDERAL GOVERNMENT	296	1.5
OTHER	744	3.7
TOTAL	20170	100.0

Source: Adapted from BNENR, "Profile of Registered Nurses in California," mimeo, July, 1971.

there are good information flows among employers and employees, and this eighty percent very likely behaves as one coordinated "rational" market. This market would appear to be dominated by the hospital sector.

In the hospital sector, an earlier study gives the employment totals shown in Table 2-2 for California.[16] From this table it can be seen that proprietary hospitals (operated by private owners for profit) accounted for about 12.4% of the hospital RN employment in California in 1968. Thus the dominant force in RN employment is the nonprofit hospital, with the private, nonprofit (voluntary) drawing something like twice as many RNs from the market as government hospitals. To what extent can a nonprofit firm be expected to behave like the profit maximizing firm discussed earlier?

Market Imperfections: (1) Nonprofit Firms

Joseph Newhouse conceptualizes the nonprofit hospital as a maximizer of the quality and quantity of output subject to a budget constraint.[17] As Newhouse points out, this still implies least-cost production and the equalization of marginal product per dollar across all inputs. He only finds fault with the "efficiency" of the resource allocation by nonprofit hospitals in ". . . a bias against producing lower quality products and barriers to entry

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[16]It should be noted that the much larger numbers in this table reflect a census of hospitals while the earlier figures are from a sample of RNs and were not inflated to represent the total.

[17]Joseph P. Newhouse, "Toward a Theory of Nonprofit Institutions: An Economic Model of a Hospital," AER, 60: 64-74, March, 1970.

Table 2-2

RN EMPLOYMENT IN CALIFORNIA HOSPITALS, 1968

TYPE OF HOSPITAL[1]	NUMBER	PERCENT
FEDERAL HOSPITALS	3203	7.2
LONG-TERM HOSPITALS (Non-Federal)	3391	7.7
SHORT-TERM HOSPITALS		
VOLUNTARY	23838	54.0
PROPRIETARY	5481	12.4
GOVERNMENT (State & Local)	8224	18.6
TOTAL	44137	100.0

Source: USHEW, PHS, Nursing Personnel in Hospitals - 1968, May, 1970.

[1]Federal hospitals include all hospitals operated by the U.S. Government. Long-term hospitals are those whose average patient stay is over thirty days (these are mostly psychiatric hospitals). Short-term hospitals have average patient stays under thirty days and are divided by ownership class into Voluntary (privately owned, nonprofit); Proprietary (private profit-making), and Government (state and local) hospitals.

resulting from nonprofit status."[18] However, it is clear that since inputs help define the quality of care, and the vector of quality characteristics locates the hospital's demand function, the implication of the Newhouse model is a bias favoring higher quality inputs. In the RN labor market this would be expected to be manifested in a twist of demand in favor of more highly educated RNs.

Feldstein uses the same type of model in his study of hospital inflation, but he did not develop the input side of his model.[19] Lee develops a "conspicuous production" theory of nonprofit hospital behavior through hospital administrators' utility maximization.[20] Administrators' utility is related directly to the status of the hospital which in turn is seen as deriving from the variety, quantity, and complexity of inputs.

> Qualitatively, we would expect conspicuous production to result in the use of inputs superior to those warranted by production requirements. Highly trained personnel may be employed to perform tasks suitable for persons with less training, and equipment of advanced and complex design may be used for tasks not requiring such sophisticated equipment.[21]

The implication is the same as Newhouse's: a higher quality nursing input than is absolutely required.

Pauly and Redisch have recently produced a model of the hospi-

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[18] Newhouse, p. 69.

[19] Martin S. Feldstein, "Hospital Cost Inflation: A Study of Nonprofit Price Dynamics," AER, 61:853-72, December, 1971.

[20] M. L. Lee, "A Conspicuous Production Theory of Hospital Behavior," Southern Economic Journal, 38:48-58, July, 1971.

[21] Lee, pp. 54-55.

tal as a physicians' cooperative.[22] Thus the goal of the hospital is to maximize the incomes of the physicians who practice in and exercise de facto control over it. This is a very interesting descriptive model, but the implications for the RN market are not clear. The impact of the educational or occupational distribution of the nursing staff on "profitability" of the hospital would be a combination of the effect on demand for hospital services, substitutability for physician input, and the cost of the nurses. This model would seem to minimize the differences between nonprofit and for-profit hospitals however.

The existence of hospitals operated for a profit suggests the obvious empirical approach: comparison of input usage by hospitals of different ownership types that are alike in all other respects. The economist tends to take for granted the interest in efficiency and minimum cost production on the part of private, profit-making firms. All the incentives of the owner work in that direction. Futhermore, the lack of any kind of subsidy makes the proprietary (for-profit) hospitals more dependent on success in the marketplace. They must offer a product the consumer likes if they are to survive. Thus the instincts of the economist lead him to feel that the proprietary hospital may be a better representative of "desirable" hospital behavior since, if it is successful, it is meeting the test of the market. This runs directly counter to the thinking of health professionals however. Faced with a comparison of two identical hospitals, one proprietary and one voluntary, the

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[22] Mark Pauly and Michael Redisch, "The Not-For-Profit Hospital as a Physicians' Cooperative," AER, 63:87-99, March, 1973.

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economist is inclined to ask, "How inefficient is the nonprofit firm?" A health professional is more likely to ask, "Where is the proprietary hospital cutting corners and damaging the welfare of the patients and/or staff?" Thus a fundamental bias is revealed. This is not a trivial disagreement but reflects both the theoretical base and the analytical habits of practitioners of different disciplines. When the economist talks about the input usage of firms "alike in other respects," he is referring especially to the output of the firms. Thus the problem reduces to one where two firms produce exactly the same output, but one uses fewer inputs than the other in doing so. This is the sense in which one firm is more efficient than the other.

The health professional however is reflecting a very real concern about the output of two hospitals that may appear to be alike in external characteristics of number of beds, patient census, special facilities, or ownership type. The health professional knows from intimate association that caseloads vary considerably both over time and across institutions, and the need for inputs to serve those caseloads varies similarly. Thus the quantity of output will vary even though the same number of patients may be served.

Secondly, while economists are used to (some would say inured into) assuming that consumers have good information and are rational, utility maximizing agents and thus, can be trusted to represent their own interests in an optimal way, health professionals are not used to assuming that the consumer knows what is best for him. She (or he) has to face the ignorance and prejudices of consumers

on health matters every day.[23] Further, the health professional knows the potential for cheating or misleading consumers. Thus the ethics of the professions emphasize maximizing the quality of care as well as the quantity. This also accounts for the strong ethic against price competition in health care. Thus when an economist holds up a proprietary hospital as a model of efficiency, a health professional in inclined to find it offensive.

In principle the quantity of output is precisely measureable, but data sources currently available are not sufficient to do this adequately. The quality of output, however, is a tough theoretical issue as well as being empirically impossible at this point. A beginning must be made however and while we recognize it may do violence to the beliefs of health professionals, we will proceed with comparisons between nonprofit hospitals and profit-making hospitals assuming output (both quality and quantity) equality. It is important to emphasize that this is not an assertion of fact (or even belief), but that it is an assumption made in the interests of expediency. Without some such simplifying assumption, no comparison of nonprofit and proprietary hospitals is possible.[24] Further it can be argued that this is a limiting case and is worthy of analysis on that basis alone. Thus if we assume output equality

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[23] In a classic article Arrow has argued that the elements of uncertainty (and ignorance) present in the health care market are sufficient to explain its unique character. See Kenneth Arrow, "Uncertainty and the Welfare Economics of Medical Care," AER, 53:941-73, December, 1963.

[24] See Harry Greenfield, Hospital Efficiency and Public Policy (New York: Praeger, 1973), Chapter 1 for an alternative discussion of this problem.

(both quantity and quality of output) and find no differences in the input usage between nonprofit and proprietary hospitals in an analysis with that maintained hypothesis, those who believe that nonprofit hospitals produce higher quality output can argue that nonprofit hospitals are more efficient because they use the same input set and produce "more" output.

Empirical work on comparisons between for-profit and nonprofit hospitals has not been satisfactory due to the lack of data. But the models reflect the questions many observers have about the behavior of nonprofit hospitals, in particular the attention to the quality of inputs. This is apparent on the capital input side of the hospital production function but not on the labor input side.[25] The small proprietary hospital sector in California is valuable to us because it makes possible comparisons between the dominant nonprofit hospital, whose cost minimization and efficiency goals may be suspect, and the for-profit hospitals whose goals are more clearly understood.

While there is no source of data permitting analysis of employment of RN inputs by educational preparation by ownership of hospital, it is possible to make some rough comparisons of input usage across the broader nursing manpower spectrum. Thus we will look

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[25]See for example Kenneth W. Clarkson, "Some Implications of Property Rights in Hospital Management," Journal of Law and Economics, 15:363-84, October, 1972; Karen Davis, "Economic Theories of Behavior in Nonprofit, Private Hospitals," Economic and Business Bulletin, 24:1-13, Winter 1972; Daniel Hill and David Stewart, "Proprietary Hospitals Versus Nonprofit Hospitals: A Matched Sample Analysis in California," Blue Cross Reports, 9:10-16, March, 1973; and Ronald G. Ehrenberg, "Organizational Control and the Economic Efficiency of Hospitals: The Production of Nursing Services," Journal of Human Resources, 9:21-32, Winter 1974.

at the total employment of nursing manpower (Registered Nurses, Licensed Vocational Nurses, and aides, orderlies, etc.) by nonprofit and proprietary hospitals in an attempt to determine the degree of "distortion" of demand that might be introduced by the dominance of nonprofit firms. This analysis will only be indicative of firms' motivation, not a conclusive analysis of manpower utilization by type of hospital. This will permit some simplifying assumptions that would not be acceptable if the more definitive comparisons were the goal. The broad question is how "good" is the labor market for RNs, i.e., how different is it from the competitive labor market envisioned by economic theory, as represented in the marginal conditions presented at the beginning of the chapter? How much faith can be put in the wages measured in such a market when our interest is in productivity differences among RNs by educational preparation?

The source of Table 2-2 is a census of hospitals' nursing manpower usage conducted in May, 1968 by the American Hospital Association and the U.S. Public Health Service. Employment (both full-time and part-time) by job title by functional area of the hospital (nursing service administration, inpatient units, outpatient units and emergency room, operating room, non-nursing service areas) is presented by state, size of hospital, and ownership of hospital. This makes possible a fairly close comparison of nursing input usage among hospitals in California by ownership type, but still does not control for output quantity as well as would be hoped. By dealing only with nursing input to inpatient units, we can compare nursing manpower usage by ownership type for the sector of the hospital which is most directly identified with

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nursing as a function and can avoid the confusion of lumping in special facilities. All hospitals possess inpatient units, but not all hospitals contain emergency rooms, outpatient departments, maternity units, pharmacies, or any other facility you can name. Thus quantity of output is controlled more closely than when dealing with the entire hospital, but there will still be differences in the quantity of output arising from different case mixes and the like.

The analysis proceeds from the assumption that proprietary hospitals are efficient profit-maximizers and can, therefore, be used as standards of comparison against which the input usage of nonprofit hospitals can be matched. That is, the numbers and occupations of nursing manpower used by the proprietary hospitals on inpatient units is assumed to be the "efficient" input set. Then the nursing inputs of nonprofit hospitals of similar size (and by assumption, similar output) to their inpatient units can be compared to this standard.[26] Finally, the implications for the nursing labor markets are examined. It is also assumed in this analysis that different types of hospitals face similar wage structures for nursing manpower.

Table 2-3 shows nursing manpower inputs (in full-time equivalents, where part-time nurses are assumed to work half-time on the average) in various job titles by ownership of the hospital. Note first that inpatient units in the voluntary hospitals (private,

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[26]For a more ambitious effort in comparing manpower inputs across ownership types, but between voluntary and local government hospitals, see Myron Fottler, Manpower Substitutions in the Hospital Industry: A Study of New York City Voluntary and Municipal Hospital Systems (New York: Praeger, 1972).

Table 2-3

MANPOWER INPUT ON INPATIENT UNITS BY OWNERSHIP
California Short-term Hospitals

JOB TITLE	EMPLOYMENT PER PATIENT[1]		
	V	P	G
SUPERVISOR & ASST	.025	.048	.027
HEAD NURSE & ASST	.086	.109	.097
STAFF NURSE	.404	.280	.271
ALL RN	(.515)	(.437)	(.395)
LVN[2]	.187	.156	.192
AIDES, ORDERLIES, ETC.	.418	.586	.429
CLERICAL PERSONNEL	.085	.075	.050
TOTAL	1.206	1.254	1.067
EMPLOYMENT (fte)	36362	9503	14283
PATIENT CENSUS	30153	7578	13382
HOSPITALS	248	164	122
AVERAGE NO. OF BEDS	162	66	160

Source: Derived from data in USPHS, Nursing Personnel in Hospitals, 1968.

[1]Employment is in full-time equivalents (fte) where part-time workers are assumed to work half-time on the average. V = Voluntary hospitals (private, nonprofit); P = Proprietary hospitals (private for profit); G = State and Local Government hospitals.

[2]LVN = Licensed Vocational Nurse

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nonprofit) use a considerably higher number of staff RNs per patient than do proprietary hospitals (.404 to .280). On the other hand, the voluntary hospitals use fewer aides, orderlies, etc. per patient than the proprietary ones (.418 to .586). But this "twist" in favor of higher quality labor inputs in voluntary hospitals has another aspect. Since the average skill level of the employees is greater, less direct supervision should be required. This is demonstrated by Table 2-3 also. Proprietary hospitals do use considerably more supervisors and head nurses per patient than voluntary hospitals. Thus the contrast in total RN input is less marked than for staff RNs alone. It is also worthy of mention that the overall employment per patient for voluntary and proprietary hospitals is very nearly identical. This indicates that it is possible to substitute the lower skilled nursing manpower and its supervision without substantially increasing total employment. Recall that the maintained hypothesis here is that output per patient is the same, both in quantity and quality.

These findings tend to support those models of nonprofit hospital behavior that emphasize the "distortions" of factor demand caused by the concern for quality of output, provided one accepts the premise that proprietary hospitals are less concerned with quality than voluntary hospitals and if one believes that substituting aides for RNs and LVNs tends to lower the quality of care.

No mention has been made of the state and local government hospitals here and they will be excluded from further analysis. The input measures in Table 2-3 show that these public hospitals are substantially different from the others. The total employment per patient is lower and the general pattern of input use reflects

the lower quality of output implied by conventional wisdom and casual empiricism. In addition, the great diversity among government hospitals further casts into doubt the assumption, necessary in this analysis, that the output per patient is identical across ownership class.

These comparisons are all clouded, however, by the difference in distribution of hospitals by size in the proprietary sector. Summary figures at the bottom of Table 2-3 reveal that proprietary hospitals are less than half as large (in number of beds) on the average as the nonprofit hospitals. Presumably this is a direct result of the capital subsidy available to voluntary hospitals. All large hospitals in California are nonprofit. Thus, Table 2-3 may be confounding ownership differences with size differences. This is particularly troublesome since size of hospital is closely related to output. Thus size constitutes an important output control in this rough analysis. Fortunately, this same data source permits us to add the size dimension to these comparisons.

Table 2-4 compares manpower usage by job title for the three hospital size categories which contain all but one of the proprietary hospitals in California. The last line of the table shows that the average number of beds within size grouping is now fairly close. The greater usage of staff RNs by voluntary hospitals carries across all the size groupings, but the difference narrows as size increases. The proprietary hospitals are again shown to use more aides, supervisors and head nurses. Only in the smallest size group is there no considerable difference in the number of aides, but here the slack is apparently taken up by use of LVNs in the proprietary hospitals (this is the only size category where

Table 2-4

MANPOWER INPUT ON INPATIENT UNITS
BY OWNERSHIP AND SIZE
California Short-term Hospitals

JOB TITLE	EMPLOYMENT PER PATIENT[1]					
	Less Than 50 Beds		50 - 99 Beds		100 - 199 Beds	
	V	P	V	P	V	P
SUPERVISOR AND ASST	.053	.056	.039	.054	.028	.036
HEAD NURSE AND ASST	.092	.102	.089	.118	.089	.098
STAFF NURSE	.281	.216	.338	.282	.386	.342
ALL RN	(.426)	(.374)	(.466)	(.454)	(.503)	(.476)
LVN	.176	.195	.185	.146	.197	.146
AIDES, ORDERLIES, ETC.	.558	.575	.514	.633	.438	.556
CLERICAL PERSONNEL	.096	.116	.049	.062	.080	.061
TOTAL	1.256	1.259	1.214	1.295	1.219	1.240

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Table 2-4 (continued)

JOB TITLE	EMPLOYMENT PER PATIENT[1]					
	Less Than 50 Beds		50 - 99 Beds		100 - 199 Beds	
	V	P	V	P	V	P
EMPLOYMENT (fte)	1083	1998	4127	4892	8740	2462
PATIENT CENSUS	862	1587	3400	3778	7169	1986
HOSPITALS	40	72	66	70	66	21
AVERAGE NO. OF BEDS	35	33	74	76	152	140

Source: Derived from data in USPHS, Nursing Personnel in Hospitals, 1968.

[1]Employment is in full-time equivalents (fte) where part-time workers are assumed to work half-time on the average. V = Voluntary hospitals (private nonprofit); P = Proprietary hospitals (private for profit).

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proprietary hospitals use more LVNs per patient than do voluntary hospitals).

Overall the pattern is confirmed. Proprietary hospitals use more lower skilled personnel with more supervision than do voluntary hospitals of similar size. However, the overall number of personnel per patient remains the same (the only difference is in the 50-99 bed size). Note however that the contrasts are a good deal less than appear in the aggregated data of Table 2-3. Nevertheless, the conclusion is that hospitals that are operated for a profit do use a different mix of nursing personnel in the provision of basic nursing care. Further, this difference is in the direction that would be expected if nonprofit hospitals were in a position to maximize the use of high quality inputs as a means of increasing the prestige or the output quality of the hospital. This difference in the labor input to the nursing function in the proprietary hospitals should yield a cost advantage over the voluntary hospitals, perhaps establishing a margin which constitutes the return on owner's equity.

While these are the best data available, there is still cause for caution. It is possible that there are systematic patterns in the usage of part-time personnel that are not picked up by the simplifying assumption that they work half-time on the average, regardless of which occupational group of hospital type they work in. It is easy to see that various patterns of part-time employment could radically affect the results.

There is another question which arises in the interpretation of these differences in nursing manpower usage as being solely due to the quality consciousness of voluntary hospitals. The over-

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whelming majority of proprietary hospitals are located in southern California. If wage differentials between RNs, LVNs and aides are not similar for northern and southern California, it would be rational in each area, whatever the ownership, to alter factor proportions to reflect local factor prices. In point of fact, aides are relatively less expensive in Los Angeles compared to San Francisco. The BLS Industry Wage Survey for hospitals reveals that a female aide in Los Angeles is paid 56% of the RN salary, while in San Francisco she would be paid 64% of the RN average.[27] A rational hospital in Los Angeles should attempt to substitute aides for RNs to bring their productivity per dollar of cost into equality. Unfortunately, there are no data available for settling this question by further disaggregation. The point is that at least some of the difference in nursing manpower input proportions attributed to ownership differences is a result of wage differentials. Thus the differences attributed to ownership are overstated.

Although these data are fairly detailed and permit the best look so far at nursing manpower inputs to hospitals, the output side is still the big question. Output quantity has been "controlled" by confining our analysis to inpatient units in hospitals of similar size. However, intensive care and coronary care units are inpatient units also. So highly specialized nursing units are still included, and one cannot conclude that the gross output control employed here is good enough. Unless the incidence of these specialized units is the same in the proprietary and voluntary

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[27] U.S. Department of Labor, Bureau of Labor Statistics, Industry Wage Survey: Hospitals, March 1969, Bulletin 1688, 1971, pp. 20-21.

sectors, we cannot say with great conviction that the output of proprietary and voluntary hospitals of similar size is the same.

Familiar fears of proprietary hospitals "skimming" the cream of the patient crop and avoidance of unprofitable lines of hospital output are still operative in the output side of the hospital market.[28] Presumably the nonprofit hospitals with more direct answerability must provide these services, which are nonetheless thought to be needed by the community, regardless of their profitability. This is aside from the even deeper issue of the actual quality of care delivered to a patient of a given type. But given these qualifications, what is the overall impact on the RN market of the differences in nursing manpower demand by ownership of hospital which have been presented here?

One way of answering this question is to assign to all voluntary hospitals the staffing ratios of proprietary hospitals of similar size and examine the effect on the total requirements for the various occupational groups under these "hypothetical" conditions. Demand for nursing manpower on inpatient units is "reconstituted" in accord with the total patient census for each size group and the employment per patient of proprietary hospitals in the size group (given in Table 2-4). Then the actual numbers of nursing personnel employed by voluntary and proprietary hospitals with less than 200 beds can be compared against the hypothetical employment that would result if voluntary hospitals used the proprietary manpower inputs per patient.

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[28]See David A. Stewart, "The History and Status of Proprietary Hospitals," Blue Cross Reports, 9:2-9, March, 1973.

Table 2-5 shows that reconstituting demand in this way further demonstrates the skill twist mentioned earlier. Substantial increases in supervisors and head nurses on the one hand, and aides, orderlies, etc. on the other, are implied. Decreases in staff RNs, LVNs and unit clerical staff are also indicated. The interesting fact is the offsetting tendencies within the RN group. Thus the hypothetical reduction in demand for staff RNs is largely offset by the increase in demand for RNs to serve as supervisors and head nurses. The net decline in employment of RNs is indicated in Table 2-5 at about three percent. Given the rough and ready nature of this analysis, little confidence should be placed in the precision of this estimate and the significance of its difference from zero is of course unknown.

Further work is needed here, but the preliminary indications are that the distortion of overall RN demand resulting from the domination of nonprofit firms is not very severe, particularly considering that the assumptions of this exercise have been such as to maximize the apparent differences. The general consensus would be that differences in case mix and in quality of care would at least partly explain the nursing inputs of voluntary hospitals. While nonprofit firms appear to utilize higher quality nursing inputs, as implied by the models discussed earlier, the effect on aggregate demand for RNs is mitigated by the increased requirement for supervisory personnel.

This analysis has examined the quality distortion when viewed from the perspective of all nursing manpower input. But more to the point for the purpose here, does this kind of quality twist operate across the three types of Registered Nurse? The models

Table 2-5

ESTIMATED CHANGES IN HEALTH MANPOWER DEMAND ON INPATIENT UNITS UNDER "EFFICIENT" CONDITIONS
California Voluntary and Proprietary Hospitals
With Less than 200 Beds
May, 1968

JOB TITLE	ACTUAL EMPLOYMENT	RECONSTITUTED[1] EMPLOYMENT	PERCENT DIFFERENCE
SUPERVISOR & ASST	749	855	+ 14.2
HEAD NURSE & ASST	1821	1994	+ 9.5
STAFF RN	6250	5684	- 9.1
ALL RN	(8820)	(8533)	(- 3.3)
LVN	3342	2863	- 14.3
AIDES, ORDERLIES, ETC.	9775	11042	+ 13.0
CLERICAL PERSONNEL	1365	1287	- 5.7
TOTAL	23302	23725	+ 1.8

Source: Derived from data in USPHS, Nursing Personnel in Hospitals, 1968.

[1]The reconstituted employment results from assigning the proprietary hospital personnel per patient ratios for each hospital size class (from Table 2-4) to the patient census of voluntary hospitals in that size class. Then this hypothetical employment in voluntary hospitals by job title is added to the actual proprietary employment by job title to "reconstitute" demand for health manpower.

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would imply this, provided hospital decision makers and/or consumers saw more highly trained RNs contributing to the vector of output quality characteristics discussed earlier. There is little evidence of this. In fact, casual empiricism suggests that many physicians find Diploma RNs preferable to either ADN or BSN grads. In any event, no study of hospital manpower inputs has collected data sufficiently detailed to differentiate RNs of different educational preparation.

While the sample described here (Chapter II) is of individual RNs, the fact that it is a simple random sample of all RNs means that if we confine our attention to those employed in hospitals we can get an estimate of RN factor proportions utilized by hospitals of various ownership types. If we knew where every RN worked, we could simply accumulate by employer ownership type and find the total RN input to firms of that ownership type. We would have no way of assessing the importance of the RN input in relation to other inputs but we would have a complete accounting of the magnitude of the RN input itself. By the same token, a random sample of all RNs enables us to estimate (subject to sampling error) the educational mix of the RN manpower input to each hospital ownership type.

Table 2-6 presents these estimates from our sample. Note that voluntary hospitals appear to use a higher proportion of ADN (presumably the lowest quality RN input, at least as measured by training period) and a lower proportion of DIP than the proprietary hospitals. These differences are not statistically significant however. The BSN proportions in voluntary and proprietary hospitals are the same. While this is not very strong evidence, it does

Table 2-6

PROPORTION OF RN INPUT BY RN EDUCATION
BY OWNERSHIP OF HOSPITAL
RNs Working in Hospitals Only

HOSPITAL OWNERSHIP[1]	DIP	ADN	BSN	TOTAL	n
GOVERNMENT	.763	.153	.085	1.000	118
VOLUNTARY	.702	.172	.126	1.000	302
PROPRIETARY	.740	.130	.130	1.000	77

[1]Government hospitals here include all levels of government; Voluntary and Proprietary hospitals are defined as before. The education groups are: DIP = Diploma; ADN = Associate Degree in Nursing; BSN = Bachelor of Science Degree in Nursing.

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tend to support doubts about the extension of the quality distortion effects of nonprofit hospitals to the intra-RN spectrum. Thus fears of distortions in demand for the three RN educational groups due to the dominance of nonprofit hospitals in the market for RNs are not as acute as the earlier evidence suggested. Firm conclusions must await a detailed investigation of all manpower inputs by hospital ownership with particular attention to educational differences among RNs. But the tentative conclusion here is that the magnitude of these distortions in demand, and hence in relative wages, is quite small.

Market Imperfections: (2) Monopsony Power

Even casual observation reveals that there is a great deal of concentration in the hospital industry. There are rarely more than a handful of short-term general hospitals even in large communities. While this is more of a problem on the output side (probably the reason for the social attitudes against hospitals operated for profit), it also raises questions of monopsony power on the labor market side.

Donald Yett was the first economist to analyze the demand for nurses by means of a monopsony model.[29] Yett reported that in fourteen of fifteen cities responding to his inquiry, the local hospitals had an active "wage stabilization" policy in force to prevent wage competition among themselves. The one city without such a program wrote back asking for more information as to how

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[29]Yett, "Causes and Consequences of Salary Differentials in Nursing," Inquiry, 7:78-99, March, 1970.

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one could be established.[30] Devine reports a very interesting incident in Los Angeles involving an attempt by one of the local hospitals to break out of the cartel and use market forces to increase its nursing staff.[31] This was condemned by the cartel in terms worthy of a textbook on monopsony.

Hurd recently attempted to test empirically the hypothesis that hospitals really use the monopsony power available to them.

> . . . it can be concluded that monopsony power is exerted in the labor market for nurses in order to hold wages down. This fact is most clearly demonstrated by the consistent negative relationship between the earnings of nurses and the concentration ratio for the hospital sector of the market.[32]

If monopsony power is an accepted fact in the nursing labor markets, how does this endanger our efficiency requirement that RNs be paid according to their marginal product?

Yett used the monopsony model to explain the nature of the nursing "shortage."[33] As shown in Figure 3, the shortage of nurses is seen as the direct result of monopsony power. The monopsonist sets the wage that maximizes his profits W_0, and hires L_0 nurses at that wage. The fact that at that wage he would like to hire L* nurses if he could get them, and thus reports $L^* - L_0$ vacant posi-

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[30] Yett, p. 90.

[31] Eugene J. Devine, Analysis of Manpower Shortages in Local Government (New York: Praeger, 1970), pp. 55-56.

[32] Richard W. Hurd, "Equilibrium Vacancies in a Labor Market Dominated by Non-Profit Firms: The Shortage of Nurses," Review of Economics and Statistics, 55:239, May, 1973.

[33] Yett, pp. 91-92. He attributes the monopsony model to G. C. Archibald, "The Factor Gap and the Level of Wages," Economic Record, 30:187-99, November, 1954.

Figure 3

MONOPSONY MARKET MODEL

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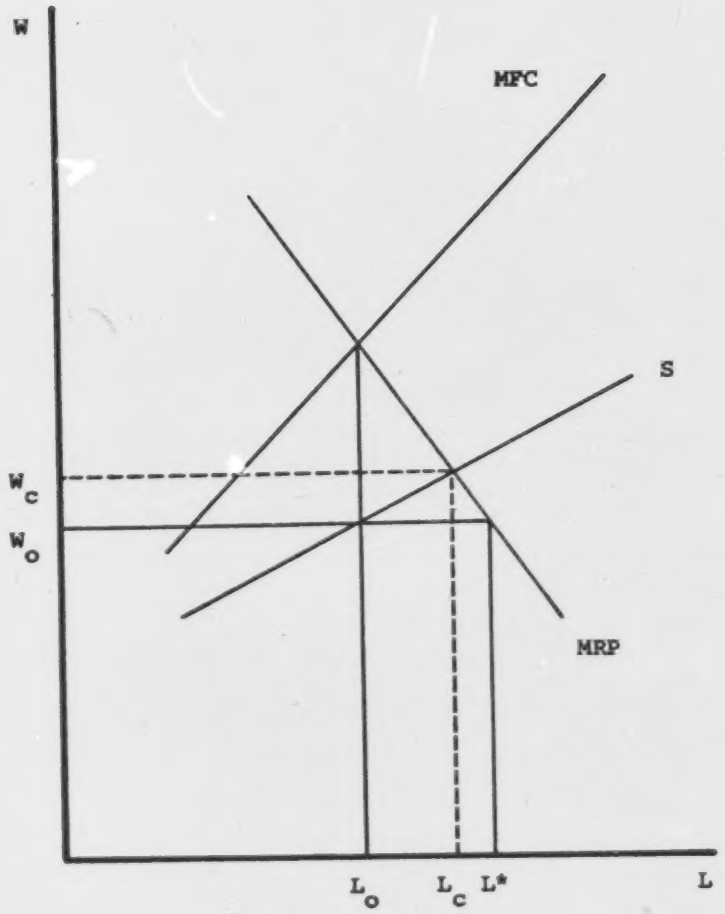

tions is not particularly interesting or meaningful. The important point for this analysis is that monopsony power in the market for RNs will lead to a lower wage and lower employment than would prevail if the same market could be organized competivively (W_c and L_c). The fact that monopsony power distorts the resource allocation process is demonstrated in that the monopsonist does not equate the wage and the marginal revenue product but pays a wage less than the marginal product. Demand for RNs is thus effectively reduced by the presence of monopsony power in the RN labor market.

However, we are more directly concerned here with the question of whether monopsony power would tend to distort the relative wages of the different types of RN. That is, is the impact of monopsony similar for ADN, DIP, and BSN RNs? It is clear that since RNs with a Bachelor's Degree have access to more jobs outside the hospital-dominated sectors (e.g., public health, school nursing, nursing education), the monopsony power due to hospital concentration would be less in their case. This should tend to produce a positive wage differential for BSN nurses, especially since these other areas tend to be higher wage areas. There does not appear to be any reason to expect the incidence of monopsony to differ between ADN and DIP Registered Nurses however. Thus, while the general wage level may be lower than in the absence of monopsony power, the relative wages of these two would not differ.

To sum up the discussion of demand distortions in terms of theoretical wage effects, the quality consciousness of the nonprofit firms would tend to raise BSN wages and lower ADN wages, provided length of training program is a reliable index to quality of

RN input and provided quality of RN input is a relevant element in quality of hospital output. Limited empirical work fails to provide evidence to support these contentions for the three RN types however. Monopsony power would only affect the BSN differential. Since both demand imperfections (nonprofit firms and monopsony power) work in the same direction for BSN RNs, we would expect to find a higher relative wage for BSN-prepared RNs than would be obtained under conditions of perfect competition. There is a weaker expectation, deriving from the behavior of nonprofit firms and contradicted by slight empirical evidence, that ADN wages would tend to be lower than DIP wages. In any event, these effects are expected to be rather small and, especially in the second case, their detection in empirical work (with the usual measurement problems) is problematical. Let us turn now to an examination of the workings of the other blade of Marshall's famous scissors, namely the supply of Registered Nurses.

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SUPPLY OF RNs

The supply side of the market for RNs does not offer the same degree of hazards encountered on the demand side. The supply of Registered Nurses is quite free and unfettered compared to most other occupations, both at a single point in time and through time. First, there is always a vast pool of RNs not in the labor force; usually this runs to about one-third of the total registrants. This ready reserve is composed mostly of married women. These "secondary workers" are one of the few groups that has repeatedly demonstrated sensitivity to wage incentives; their supply is relatively wage elastic.[34]

Actual estimates of the elasticity of supply of RNs have varied widely. Stuart Altman developed a conjectual model based on hypothetical values representing the relation between the value of market goods and home goods and the relative value of leisure.[35] He attributed values for these utility relationships according to marital status and the presence of children. His overall estimate of the elasticity of supply from this a priori model was in the range .70 to 1.00. This resulted from summing estimates of elasticities of zero for single RNs, 1.06 to 1.68 for married, no

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[34]We are indebted to Mincer and Cain for their pioneering work in this area. See Jacob Mincer, "Labor Force Participation of Married Women." Aspects of Labor Economics, National Bureau of Economic Research (Princeton: Princeton University Press, 1962), and Glen Cain, Married Women in the Labor Force (Chicago: University of Chicago Press, 1966).

[35]Altman, Appendix V-A, pp. 117-139.

children and 1.43 to 1.71 for married with children. In a more conventional single equation cross-sectional estimate for forty-nine states in 1960, he obtained estimates of wage elasticities at the sample mean of .61 for all RNs and .86 for married RNs.[36]

Bishop estimated a wage elasticity of supply of .54 for married RNs across 141 Massachusetts cities in 1966.[37] Hixson reported an overall elasticity of .27 for all Michigan RNs.[38] In a study based on a survey of RNs similar to ours, Bognanno estimated wage elasticities of .48 for single and .37 for employed, married RNs in Iowa in 1968 when supply was measured in hours per week.[39] It should be mentioned, however, that suspicions are aroused by any result that indicates a higher elasticity of supply for single women when estimated across individuals. The impact of Mincer's development of the family labor supply model has been to demonstrate the importance of the "home wage" to market wage comparison in making married women's labor supply more elastic than that of single women.

As in the earlier demand examinations, we have to go on to

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[36]See Altman, the table on p. 132 for the a priori model results and p. 135 for the regression results.

[37]Christine E. Bishop, "Manpower Policy and the Supply of Nurses," Industrial Relations, 12:86-94, February, 1973.

[38]Jesse Hixson, "The Demand and Supply of Professional Hospital Nurses: Intra-Hospital Resource Allocation," (unpublished Ph.D. thesis, Michigan State University, 1969), p. 34, reported in Bishop, p. 93.

[39]Mario Bognanno, "An Economic Study of the Hours of Labor Offered by the Registered Nurse," (unpublished Ph.D. thesis, University of Iowa, 1969), pp. 75 and 96. See also some later work based on these data: M. F. Bognanno, J. S. Hixson and J. R. Jeffers, "The Short-Run Supply of Nurse's Time," Journal of Human Resources, 9:80-94, Winter 1974.

probe the elasticities of supply for each of the three types of RN. This is particularly important since the magnitude of the wage distortions produced by demand irregularities depends also on the elasticity of supply of the factor in question. The more elastic the supply, the smaller the wage distortion that would result from any distortion of demand from the perfectly competitive case. Unfortunately there has been no empirical work whatever on this question. Since the three RN educational programs do differ by length and cost, there is a theoretical expectation that the elasticity of supply over time would be related to RN education, with the shorter, cheaper programs exhibiting a more elastic supply. At a point in time, however, the theoretical result is not clearcut.

The theory of labor supply suggests the consideration of such factors as the opportunity sets available to the individual (both pecuniary and non-pecuniary aspects), tastes, age, family status, and non-wage income. These would be added to the elementary consideration of the stock of the factor not currently employed. Registered Nurses' skills do not seem to be of wide applicability outside nursing (training is specific to the health care industry), so the consideration of alternative sets is not very important in this case. However, such differences as there are would seem to favor the BSN group. Taste factors would enter in to the extent that BSN RNs have a wider variety of work available to them. Hence it is hypothesized that tastes would be relatively more important in their motivation than for the other groups. Conventional wisdom also suggests that BSN nurses are likely to have higher family income levels (if married) since they are more likely to have married a professional or managerial husband.

All these factors would lead one to expect that the elasticity of supply would be less for the BSN education type. On the other hand, there is no reason to suppose there would be any significant differences between ADN and DIP RNs in the cross-sectional elasticity of supply. Thus the overall conclusions are that the supply of BSN RNs should be least elastic and that there are minimal differences between ADN and DIP RNs with possibly somewhat greater elasticity over time for the ADN.

As for the question of the educational system itself restricting supply of certain types of RN in the short run due to imbalances between the supply of and demand for training slots, the only evidence available is some unpublished data cited by Altman. In 1965 schools of nursing reported to the National League for Nursing the number of unfilled admissions spots they had available. It was found that Diploma programs could have accepted 11.1% more students, ADN programs 19.7% more and BSN programs 14.5% more than they actually did. In 1966 DIP programs reported 14.1%, ADN programs 11.4% and BSN programs 8.2% vacancies.[40] While the quality of these data is certainly unknown and the probability of significant variation about these figures for individual states is high, these numbers do not suggest restrictions of supply resulting from excess demand for a particular type of RN training.

> Although nurse training programs have undergone a radical change in the last 15 years, it appears that the shift from hospital-based diploma programs to college-based degree programs has been quite orderly. That is, the shift did not occur in a way that blocked entry into nursing.[41]

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[40] Altman, p. 77.

[41] Altman, p. 77.

Perhaps a closer inspection of the dynamics of this market for training would show that the supply of training has been keeping pace with the demand over time. Thus, as new ADN programs open their doors they forestall excess demand for training spots in the old ADN programs and are counterbalanced by a simultaneous closing of DIP programs who are no longer able to attract students. The dynamics of educational supply and demand are little understood and more study is indicated here.

Except for certain localities (notably Minneapolis and San Francisco), collective bargaining among RNs has not shown much force in private hospitals.[42] There has been an increase in militancy among RNs in the last decade, and it has been accompanied by rapid wage gains for RNs. But the coincidence of the impact of Medicare on the hospitals' "ability to pay" confuses the issue. In addition the "demonstration effect" of RN strikes in some localities combined with the earlier monopsony restraint on wages served to provide an object lesson for hospital administrators that was not forgotten when additional funds became available. Unfortunately no one has yet undertaken a comprehensive analysis of these trends. But no matter what the impact of RN collective bargaining on wages, there is no hint of a policy of restriction of supply. The RN service ethic is such that the professional associations seem to have spent all their energies in agitation about the shortage of RNs rather than in attempting to restrict supply.

There have been attempts at "raising the standards" in the

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[42]See USDL, Bulletin 1688, pp. 4-5 for the data on RN unionization.

educational realm but it seems that the impact of the 1965 ANA position paper, for example, may be to lower standards, at least as measured by the average number of years of training of RNs. The motivation in promoting the bifurcation to the technical nurse and the professional nurse probably related to questions of "quality of nursing services," but in fact it has not turned out that way. There is no move to replace LPN and LVN nursing manpower with ADN RN manpower.

The National League for Nursing has raised the accrediting standards for RN education programs in recent years, but the major impact seems to be on the cost structure of the programs rather than a restriction of access to training. Also, ADN and DIP programs can survive quite well without the blessing of the NLN. The chief advantage claimed for accreditation is that the graduates find it easier to get their credits accepted for transfers or when pursuing further training. State accreditation is required for the graduates of a RN education program to be eligible for the licensure examination, but this has not been restricting. As Altman puts it:

> The nursing labor market differs in this respect from the physician labor market. Although both appear to suffer from unfilled vacancies (a labor shortage), in the case of physicians, part of the problem is the restricted supply of available training facilities. For nurses, virtually no such constraint exists and the shortage problem rests primarily, if not entirely, on the nature of the demand for nursing services and the willingness of qualified applicants to enter nursing.[43]

Institutional restrictions on supply do not constitute important threats to the labor market methodology utilized here.

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[43]Altman, p. 77.

This examination of supply forces had lead to the following conclusions. BSN Registered Nurses are again shown to be separable. In this case, we expect their supply to be less elastic than the others, further reinforcing the expectation that BSN RNs will earn more. On the other hand, differences in supply between ADN and DIP RNs are minimal and do not seriously damage the assertion that if they are perfect substitutes, their wages will be identical.

CONCLUSION

The conclusion drawn from this analysis of the RN labor market is not that it is a perfectly competitive market with ideal resource allocating wages, but that the imperfections that do exist are not expected to lead to such serious distortions that the theoretical connection between productivity and wages is unduly disturbed. Overall it does not seem unreasonable to suppose that in the case of inputs as closely related as RNs of three different educational preparations, employers of RNs will be aware of what each type of RN can produce and what it costs to employ one. This is sufficient to establish the employers' preferences among the three types of RN and they could be expected to attempt to realize these preferences in their hiring. This would establish separate demand functions for each type of RN (if they are not perfect substitutes) and should produce RN wages that will be useful in measuring the contribution to aggregate output of each type of RN. Furthermore, if the null hypothesis is true and these three types of RN are perfect substitutes, we can expect that the wages will be the same.

Chapter III

DATA

A survey of California resident Registered Nurses was undertaken during the summer of 1973.[44] A simple random sample of names was selected from the alphabetized master file of the California Board of Nursing Education and Nurse Registration (BNENR) in Sacramento. A sampling ratio of about 1 in 60 was employed. The files consisted of open drawers of computer cards containing the RN's name, address, registration number, birthdate, expiration date of license, and school code. There was one card (and in theory only one card) for each individual ever licensed to practice as a Registered Nurse in the state of California. This amounted to 230,000 names roughly. Of this number, about 120,000 were currently licensed with California addresses. Another 36,000 held current licenses but resided outside of California.

Cards were drawn at intervals of one-half inch within the drawers and verified on current registration, California address, and birthdate 1909 or later. If the individual met these criteria and was not excluded for other reasons (religious order, military base address, address scrambled), the name and address were recorded.

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[44] Adequate guidance for the neophyte survey researcher is vital and very difficult to come by. I was very fortunate to be able to call on the resources of the Survey Research Center of the University of California, Berkeley. Particular thanks are due to Charlotte Coleman and Bill Nicholls.

Roughly half the cards drawn qualified for inclusion in the study, yielding 1,934 sample names and addresses.

By first class mail these individuals were sent a questionnaire and a letter explaining the purpose of the study (the Appendix contains the questionnaire and all three letters), and asking for their cooperation. This first mailing was made on June 15. On July 11, a second letter and another questionnaire were sent to the 993 individuals who had not yet responded to the first mailing. The third and last mailing was made on August 2 to the remaining 558 non-responding individuals. Table 3-1 summarizes the technical results of the survey. The first thing to notice is that 148 names were lost through the non-delivery of the questionnaire by the Postal Service. This was slightly under eight percent of the original sample and for the most part reflects the age of the addresses in the BNENR file. Since licenses must be renewed every two years in California, roughly half the addresses in the file at any point in time are more than one year old. Inasmuch as the U.S. Postal Service only forwards first class mail for one year following a change of address, half the RNs who have moved since renewing their licenses are lost to the sample.

A response rate of just over eighty percent of the adjusted sample size was obtained, thus holding fears about non-response bias to an acceptable level. Unfortunately, there is no way of checking any of the sample statistics against the true population values because there are no measurements available for the population. The data collected and published by the BNENR are also

Table 3-1

SURVEY RESPONSE INFORMATION

1934	SAMPLE NAMES (1 in 60 sample of California resident RNs)	
- 148	QUESTIONAIRES RETURNED BY POST OFFICE, UNDELIVERED	
	26	Addressee Unknown
	22	Moved, Left No Address
	14	No Such Street or Number
	86	Moved, Not Forwardable (forward expires after 12 months)
	148	
- 4	DECEASED	
1782	ADJUSTED SAMPLE SIZE	
- 340	NON-RESPONDENTS (19.1% of Adjusted Sample Size)	
	332	No Response
	8	Returned Blank
	340	
1442	RESPONDENTS (80.9% of Adjusted Sample Size)	
- 38	RESPONSES NOT USEABLE	
	34	Out of State
	1	Member of Religious Order
	3	Pages Missing or Scrambled
	38	
1404	CASES AVAILABLE FOR ANALYSIS	

sample data based on a response rate of about fifty percent of those renewing their licenses during a one year period.[45]

Table 3-2 gives some summary observations on our sample. There are no serious deviations from the BNENR sample except in the age distribution. On the top end, the age distribution for this survey was truncated at age 64 while the BNENR sample was unrestricted. There also appears to be a deficit in the 20-29 year year age class in our sample. This class would be expected to be smaller than others since there are very few 20 or 21 year old RNs, but our sample shows a ratio of 20-29 age class to the 30-39 age class of .604 while the BNENR sample has a ratio of .706. It is believed that this deficit reflects the undelivered questionnaire problem mentioned earlier. In the normal course of events, one would expect the 20-29 year age group to be the most mobile and thus a higher loss rate from undelivered questionnaires would be sustained in this age group.

Section D of Table 3-2 shows that about two-thirds of the RNs were employed as RNs at the time of the survey and less than four percent were working outside of the nursing field. Section E gives the number and percent of RNs in the sample residing in each of the sixteen California Standard Metropolitan Statistical Areas (SMSAs). Note that the Los Angeles-Long Beach and San Francisco-Oakland SMSAs account for exactly half the sample. Section F gives the distribution of basic (initial) RN training and Sec-

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[45] See California Board of Nursing Education and Nurse Registration, "Profile of Registered Nurses in California," mimeo, July, 1971 for the official description of the RN population in California.

Table 3-2
SUMMARY SAMPLE DESCRIPTION

		NUMBER	PERCENT
A) SEX	FEMALE	1365	97.2
	MALE	26	1.9
	MISSING	13	.9
	TOTAL	1404	100.0
B) AGE	20 - 29	235	16.7
	30 - 39	389	27.7
	40 - 49	358	25.5
	50 - 59	321	22.9
	OVER 60	75	5.3
	MISSING	26	1.9
	TOTAL	1404	100.0
C) MARITAL STATUS	MARRIED	1036	73.8
	DIVORCED/SEPARATED	118	8.4
	WIDOW	51	3.6
	NEVER MARRIED	183	13.0
	MISSING	16	1.1
	TOTAL	1404	100.0
D) EMPLOYMENT STATUS	EMPLOYED AS AN RN	942	67.1
	EMPLOYED, NOT AS RN	53	3.7
	NOT EMPLOYED	410	29.2
	MISSING	0	0
	TOTAL	1404	100.0

Table 3-2 (continued)

		NUMBER	PERCENT
E) RESIDENCE	ANAHEIM-SANTA ANA-GARDEN GROVE SMSA	110	7.8
	BAKERSFIELD SMSA	15	1.1
	FRESNO SMSA	19	1.4
	LOS ANGELES-LONG BEACH SMSA	412	29.3
	MODESTO SMSA	11	.8
	OXNARD-SIMI VALLEY-VENTURA SMSA	30	2.1
	RIVERSIDE-SAN BERNARDINO-ONTARIO SMSA	52	3.7
	SACRAMENTO SMSA	70	5.0
	SALINAS-SEASIDE-MONTEREY SMSA	12	.9
	SAN DIEGO SMSA	102	7.3
	SAN FRANCISCO-OAKLAND SMSA	290	20.7
	SAN JOSE SMSA	94	6.7
	SANTA BARBARA-SANTA MARIA-LOMPOC SMSA	16	1.1
	SANTA ROSA SMSA	20	1.4
	STOCKTON SMSA	24	1.7
	VALLEJO-FAIRFIELD-NAPA SMSA	24	1.7
	NON-SMSA AREA	93	6.6
	MISSING	10	.7
	TOTAL	1404	100.0
F) BASIC RN TRAINING	DIPLOMA	1024	72.9
	ASSOCIATE DEGREE	174	12.4
	BACCALAUREATE	203	14.5
	MISSING	3	.2
	TOTAL	1404	100.0

Table 3-2 (continued)

		NUMBER	PERCENT
G) LOCATION OF BASIC RN TRAINING	CALIFORNIA	553	39.4
	EAST	197	14.0
	MIDWEST	350	24.9
	SOUTH	84	6.0
	WEST	88	6.3
	PHILLIPINES	39	2.8
	CANADA, GREAT BRITAIN	58	4.1
	OTHER	28	2.0
	MISSING	7	.5
	TOTAL	1404	100.0
H) HIGHEST EDUCATIONAL ATTAINMENT	DIPLOMA	821	58.5
	AD-NURSING	161	11.5
	AD-OTHER	29	2.1
	BS-NURSING	249	17.7
	BS-OTHER	46	3.3
	MS-NURSING	42	3.0
	MS-OTHER	25	1.8
	OTHER	24	1.7
	MISSING	7	.5
	TOTAL	1404	100.0
I) RN EDUCATION	DIP	820	58.4
	ADN	147	10.5
	BSN	125	8.9
	DIP-BS	172	12.3
	MS	67	4.8
	OTHER	65	4.6
	MISSING	8	.6
	TOTAL	1404	100.0

tion G shows the location of those basic programs. Almost three-fourths of the sample are Diploma grads and a minority of California RNs were trained in California.

Finally, Section H of Table 3-2 shows the highest educational attainment among the RNs in the sample. This introduces a complication which has been ignored up to this point in the discussion. The RN educational spectrum is actually a good deal more complicated than the discussion of the three basic programs implies. Notice that while 1,024 RNs report a basic Diploma preparation for nursing, only 821 report a Diploma as their highest educational attainment. Roughly twenty percent of Diploma grads have returned to school and successfully completed a degree (AD for some, usually BS) sometime after graduation.

Reflecting this structure, the empirical work here will distinguish the six RN educational levels shown in Section I (RNED) of Table 3-2. The DIP group will include only those who have not completed any additional degree after graduation from the Diploma program (although it does include a few people who entered a Diploma program after receiving some other degree). The ADN and BSN groups similarly are made up chiefly of those not having completed any other program, but both include a few individuals who have completed another degree on the same level, i.e., AD-OTHER or BS-OTHER. The DIP-BS group is composed of people from both Diploma and Associate Degree programs who have completed a Baccalaureate Degree, either in nursing or some other field. The MS group includes all RNs who hold any type of Master's Degree, and the OTHER group is made up of those reporting "other" for highest educational

attainment as well as a larger group of Diploma grads who have completed an Associate Degree. This configuration will facilitate comparisons between the graduates of the three basic program types while also illustrating the heavy secondary investment pattern that is typical of Registered Nurses.

Table 3-3 lists the items which were collected in the survey and indexes them to the questionnaire itself which is included here as the Appendix. The items in the background area and the questions on education were asked of all respondents. Employed RNs were to answer the questions about their employment situation while those not currently employed as RNs answered a separate group of questions designed to probe the reasons for their inactivity.

Table 3-3

VARIABLES AVAILABLE FROM SURVEY

		QUESTION NUMBER	PAGE
BACKGROUND	AGE	34	10
	SEX	35	10
	COUNTY OF RESIDENCE (labor market area)	36	10
	STATE OF HEALTH	37	10
	HIGH SCHOOL ACADEMIC RANK	38	10
	MARITAL STATUS	39	10
	LABOR FORCE STATUS OF SPOUSE	40	11
	SPOUSE CURRENT GROSS MONTHLY INCOME	41	11
	FAMILY NON-WAGE INCOME	47	12
	CHILDREN LIVING AT HOME BY AGE GROUP	43	11
	CHILD CARE NECESSITY AND COST	44-45	11
	YEARS WORKED SINCE LICENSED	4	1
EDUCATION	BASIC NURSING PROGRAM	1	1
	LOCATION OF BASIC PROGRAM	2	1
	YEAR OF GRADUATION	3	1
	HIGHEST EDUCATIONAL ATTAINMENT	6	2
	DEGREE IN PROCESS	7-8	2
	REASON FOR DEGREE IN PROCESS	9	2
	CURRENT PREFERENCE FOR BASIC PROGRAM	5	1

Table 3-3 (continued)

		QUESTION NUMBER	PAGE
EMPLOYMENT	FIELD OF EMPLOYMENT	18	6
	OWNERSHIP TYPE OF EMPLOYER	19	6
	SIZE OF EMPLOYER - NUMBER OF EMPLOYEES	21	7
	SENIORITY WITH EMPLOYER	22	7
	JOB TITLE	23	7
	SALARY	25	8
	HOURS SCHEDULED TO WORK	24	7
	HOURS ACTUALLY WORKED	26	8
	OVERTIME ARRANGEMENTS	27	8
	SHIFT DIFFERENTIAL	28-29	8
	FRINGE BENEFITS	31-33	9
	COLLECTIVE BARGAINING	30	9
	COUNTY OF EMPLOYMENT (labor market area)	20	6
NOT CURRENTLY EMPLOYED AS RN	YEAR LAST WORKED AS RN	11	3
	REASON FOR LEAVING LAST JOB	12	3
	INTEREST IN WORKING IN NEAR FUTURE	13	3
	FULL-TIME OR PART-TIME	14	4
	FIELD OF EMPLOYMENT OF INTEREST	15	4
	ESTIMATE OF CURRENT GENERAL DUTY NURSE SALARY	16	4
	THREE MOST IMPORTANT REASONS FOR INACTIVITY	17	5

Chapter IV

RN WAGE STRUCTURE - BIVARIATE RESULTS

This chapter will be concerned with the wage structure for RNs in California. First we will look at some relatively simple bivariate results: mean wage by location, employment sector, position, education, etc. This will serve to introduce the variables important in RN wage determination and begin the investigation of RN wage structure. Later all these variables will be considered simultaneously in the multivariate regression results.

The wage is derived from items 24 and 25 of the questionnaire (see Appendix). The RN reported her current gross salary in whatever time dimension was most familiar to her, biweekly, monthly, annually, etc. This was standardized during coding to a biweekly gross salary which was then divided by twice the normal scheduled weekly hours to yield the hourly wage. An examination of outlying values on this variable demonstrated that this led to obvious difficulties only in nursing education and a few isolated other cases. Because some nursing instructors reported their "scheduled" time as their classroom time, adjustments in hours were made for twelve individuals whose hourly wages appeared abnormally high in the first instance.

In general this hourly wage measure is believed to be the best feasible measure for the problem at hand. The interest centers on the hourly wage rather than earnings because the ultimate focus

here is on productivity differences. The additional considerations of accuracy and ease of reporting suggested the free form adopted in salary reporting for this survey. Even so, usable wage observations were obtained from only 879 individuals with 63 respondents not answering either the salary or the hours question (a response rate of 93.3%).

Three sources of bias in addition to possible non-response bias in this wage measurement can be identified. Most important is the gross versus net issue. While the point was made very explicit that earnings before deductions were desired, no doubt some individuals merely reported their take-home pay. This would bias the wage measure downward. The extent of this distortion is unknown. A related problem, which the free form of salary reporting was designed to minimize, arises when an individual paid on a biweekly schedule (most hospital nurses) reports earnings on a monthly basis by simply doubling the biweekly figure. This also would result in a downward bias to wages as reported here and is unknown in magnitude.

It is also likely that some individuals reported their salary directly from a salary stub or other source which may have included overtime pay or some other distorting influence which cannot be picked up in the simple measures employed here. Again, since the interest is in the wage rather than earnings this would be a distortion in that the "normal" hourly wage is overstated. There were also individuals who reported part-time hours but appeared to report a full-time equivalent salary. When this was detected in coding, it was usually possible to make an inference about the

correct salary, i.e., corresponding to hours worked, but it is likely that some such errors were not detected. These would bias the measured wage upward.

Finally, RNs working in nursing education or as school nurses sometimes reported annual salary and sometimes monthly. When annual salary was reported, unless there was evidence to the contrary, a ten month working year was assumed. Where monthly salary was reported, it is not known whether that represents the true monthly earnings or the one-twelfth of annual earnings that may be paid monthly. Wages in these areas are most open to question in the first place since these jobs are much more likely to be treated as salaried positions than hospital jobs for instance. At any rate, the measurement of wages is considered least reliable in these areas.

Table 4-1 presents mean hourly wages by the twelve geographic divisions used in this study. The RN reported the city or town where she was employed and this was coded into the sixteen California SMSAs and thirty-two other divisions, usually single counties.[46] These forty-eight labor market areas were then collapsed into the twelve that appear in Table 4-1. Seven of these represent single SMSAs, three are combinations of two adjacent SMSAs and one is a single SMSA with the addition of two adjacent counties. Both geographic proximity and wage similarity were considered in the collapsing process. The resulting twelve labor market areas

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[46]These were the labor market areas reported in the U.S. Bureau of Employment Security, Directory of Important Labor Areas (6th ed.; 1967) updated to reflect the change in SMSAs and with the two counties omitted from this directory added as separate categories.

Table 4-1

MEAN WAGE BY LOCAL LABOR MARKETS

LABOR MARKET[1]	$\bar{W}$	s^2	n	differential
SFO	5.898	1.697	175	reference
ANAH	5.245	.318	50	-11.07% **
LA	5.739	1.407	286	- 2.70%
RIV	5.043	.812	34	-14.50% **
SBOX	5.359	1.133	31	- 9.14% *
SD	4.860	1.325	57	-17.60% **
SJ	5.488	.877	63	- 6.95% *
SRVN	5.254	.636	28	-10.92% **
SAC	5.317	1.126	44	- 9.85% **
STOCMO	5.481	1.098	25	- 7.07%
FREHAVI	5.066	1.490	27	-14.11% **
OTHLOC	5.342	1.678	52	- 9.43% **
TOTAL	5.538	1.382	872	
MISSING			70	
GRAND TOTAL			942	

[1]The labor markets are:
SFO = San Francisco-Oakland SMSA; ANAH = Anaheim-Santa Ana-Garden Grove SMSA; LA = Los Angeles-Long Beach SMSA; RIV = Riverside-San Bernardino-Ontario SMSA; SBOX = Santa Barbara-Santa Maria-Lompoc and Oxnard-Simi Valley-Ventura SMSAs; SD = San Diego SMSA; SJ = San Jose SMSA; SRVN = Santa Rosa and Vallejo-Fairfield-Napa SMSAs; SAC = Sacramento SMSA; STOCMO = Stockton and Modesto SMSAs; FREHAVI = Fresno SMSA with the addition of Hanford (Kings County) and Visalia (Tulare County) labor market areas; OTHLOC = other locations.

$\bar{W}$ = mean wage; s^2 = variance of the wage distribution; n = number of observations in the category. The differential column shows the percentage difference from the reference category and the asterisks indicate rejection of the null hypothesis:

$\bar{W}_i = \bar{W}_{reference}$ at the $\alpha = .05$ (*) or $\alpha = .01$ (**) level.
See notes to Table 4-3 for the test statistic.

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represent eleven urban labor markets (with the surrounding area) and one remainder category.

It is felt that this structure represents a good compromise between two opposing considerations. On the one hand, maximum detail is desired and thus any combination of labor markets results in some loss of information. On the other hand, with sample data a larger number of categories implies a smaller number of observations per category and thus higher sampling variability, so hypothesis testing is hampered. The structure of Table 4-1 represents the maximum number of labor markets that make sense in geographic terms and in terms of average RN wages, and that contain a minimum of 25 wage observations.

Table 4-1 gives, for each of the twelve labor markets, the mean RN wage, the variance of the distribution of RN wages, the number of observations, and the percentage differential from the reference category (San Francisco-Oakland). The asterisks indicate the statistical significance of this difference, i.e., the double asterisk indicates that we can reject the null hypothesis (at the $\alpha = .01$ level) that mean wages are the same in this labor market as they are in the San Francisco-Oakland SMSA. The comparisons in all these tables will be to a particular reference category rather than to the overall mean. This pattern is necessary in the multivariate regression work that will follow and will be used here to facilitate comparisons with the later results. It should also be mentioned that the missing figures given in the tables of this chapter refer to the number of RNs who did not respond to one or the other (or both) of the two dimensions of the table. In the case of

Table 4-1, since it was stated earlier that there were 63 nonrespondents for the wage variable, it is clear that there were an additional seven nonrespondents to the location question.

The reference category for Table 4-1 is the San Francisco-Oakland SMSA, the highest RN wage area in California. All other labor markets show lower average wages, and all except Los Angeles and Stockton-Modesto are significantly lower. The range in means is considerable with the mean RN wage in San Diego falling about one dollar per hour below the San Francisco-Oakland level, roughly a twenty percent differential. There is also considerable difference in the variances of the wage distributions in the various labor markets. These variances reflect sampling variability and the complexity of the local wage structure, resulting both from job mix and from geographical heterogeneity. Thus the fact that the variance for Anaheim is only about one-third that for Sacramento may be due to the fact that the sampled RNs in Anaheim just happened to be more alike than those in Sacramento or it could reflect the existence of a more complex job structure in the Sacramento labor market (more diversity in the RN jobs available would tend to lead to more variance in wages). At the present level of analysis there is no way to tell which effect is dominant. The multivariate analysis to follow will provide a more adequate measure of the RN wage differentials due to labor market area.

Table 4-2 presents the same basic format as Table 4-1 but here the variable of interest is the sector of employment of RNs. The reference category is RNs employed in hospitals. The range of means here is quite extraordinary, from the low of $4.40/hour

in office nursing to a high of $7.90/hour in nursing education (but recall the earlier cautions about possible inaccuracies in all salaried sectors). Except for CLINIC and the OTHER category, all sectors show wages significantly different from the hospital level.

Some discussion of the characteristics of these sectors is probably in order for those not familiar with the RN job world. While everyone is familiar with the presence of RNs in hospitals, the role of the RN in direct patient care has been diminishing for some time. Conventional wisdom now has it that most staff RNs spend more time managing the lesser skilled nursing manpower than giving bedside patient care personally. In addition to managerial duties, the technical demands made on the RN today are much greater then formerly. New, complex equipment is continually being added to hospitals and this gives rise to a technological obsolescence factor among RNs. A study of inactive RNs in Virginia revealed that, as expected, the presence of young children at home was a major factor in determining the inactive state. But virtually the same number cited insecurity in relation to new treatments and procedures as an important factor in their decision.[47] In addition when these inactive RNs were asked what factors might motivate their return to active nursing, only improved salary garnered more votes than the availability of an adequate refresher course.[48] One consequence of these changes is an increasing variety of RN job

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[47]Grace M. Ricks, "Why Don't Nurses Work?" Virginia Nurse Quarterly, 35:41-51, Spring 1967.

[48]See also Marjorie Kelly, "Low-Cost Refresher Program Helps

assignments within the hospital sector. Specialties such as coronary care and intensive care, which have just grown up in the last decade, have acquired a strong independent identity. One of the issues in the 1974 nurse's strike in the San Francisco Bay Area was the assignment of "untrained" RNs to these specialty units. Management promised to avoid this action except in emergencies.

Hospitals pay moderately good wages in California ($5.50/hour, average) but the work is very demanding both physically and emotionally. In addition, the problems of around the clock staffing normally lead to the necessity of rotating shifts and weekend work rather frequently. The arrangements for spreading the burden varies with local practice but certainly for RNs low on the seniority ladder, the unpleasant working hours are a significant drawback to hospital employment. The demanding work and the difficulties of reconciling family needs with hospital work schedules (when these change every week or every few weeks) leads to a RN workforce in hospitals that is rather young, especially at the lower levels. Turnover is a serious problem at the staff nurse level and promotion out of categories requiring rotating shifts, etc. is slow. Thus for the average young RN, the hospital sector offers moderately good wages but heavy nonpecuniary disadvantages.

Nursing homes usually employ one or more RNs in a supervisory capacity to oversee the care given residents. They tend to be staffed by older RNs. One reason for this could be the technolo-

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Inactive Nurses Make Comeback," Hospitals, 43:74-76, January 16, 1969, and K. A. Archibald, The Supply and Retention of Professional Nurses and Their Recruitment and Retention by Hospitals (New York: The New York City Rand Institute, 1971), Chapter II for a general review of the literature on inactive nurses.

Table 4-2

MEAN WAGE BY EMPLOYMENT SECTOR

EMPLOYMENT[1] SECTOR	$\bar{W}$	s^2	n	differential	
HOSP	5.519	.857	547	reference	
NSHM	4.802	.630	57	-12.99%	**
CLIN	5.489	1.017	45	- .54%	
OFFC	4.402	.813	62	-20.24%	**
PVDY	5.341	.026	13	- 3.23%	*
INDL	5.112	.522	15	- 7.37%	*
EDUC	7.904	1.849	31	+43.21%	**
SCHL	6.583	2.292	32	+19.28%	**
PHN	5.947	1.130	35	+ 7.76%	*
OTHER	5.882	2.135	38	+ 6.58%	
TOTAL	5.538	1.353	875		
MISSING			67		
GRAND TOTAL			942		

[1]The employment sectors are:
HOSP = Hospital; NSHM = Nursing Home; CLIN = Clinic; OFFC = Office Nursing; PVDY = Private Duty Nursing; INDL = Industrial Nursing; EDUC = Nursing Education; SCHL = School Nursing; PHN = Public Health Nursing; OTHER = Other nursing employment sectors.

$\bar{W}$ = mean wage; s^2 = variance of wage distribution; n = number of observations in the category. The differential column shows the percentage difference from the reference category and the asterisks indicate rejection of the null hypothesis:

$\bar{W}_i = \bar{W}_{reference}$ at the $\alpha = .05$ (*) or $\alpha = .01$ (**) level.
See notes to Table 4-3 for the test statistic.

gical obsolescence discussed earlier. The nursing care given in nursing homes is much more similar to hospital nursing of twenty or thirty years ago then is current hospital nursing care. Thus a middle aged RN returning to work after her child rearing years would tend to feel more comfortable in a nursing home than a hospital. It may also be that the pace of work in general is less hectic. At any rate the mean hourly wage in nursing homes is about thirteen percent less than in hospitals.

Clinics cover a great variety of situations, from mini hospitals to birth control clinics to highly specialized technical facilities like hemodialysis centers. The diversity is represented by the high variance of wages, but the mean wage shows that this sector is most similar to hospitals. Due to the diversity of this sector, there is considerable hazard in generalization but it seems that hours tend to be more regular and predictable than in hospital work. Thus for those RNs willing to trade off the excitement of the high pressure hospital world for a more normalized working life, clinics provide an adequate option.

Office nurses work for individual physicians or group practices. This is another nursing sector familiar to the general public, but within this sector the actual work assignments can vary by office from a physician's assistant type of position (especially in pediatric practices) to a glorified receptionist. Wages are low but working conditions are relatively pleasant and working schedules can apparently be tailored to fit the needs of the RN fairly well. Thus this is an area that offers opportunities for those not prepared to make the full commitment to working that jobs in some other areas demand.

Private duty nursing was the dominant form of nursing practice before the Great Depression, but it has faded to relative unimportance in recent years. These RNs are independent practitioners who are engaged directly by the patient to care for that patient alone, either in hospital or at home. There is always a flat daily fee for private duty service which is referenced to the general duty RN wage in local hospitals. This accounts for the extremely low variance of this wage distribution. Private duty nurses typically work out of a central registry on a rotating basis and rarely work strictly full-time for long stretches at a time.

Industrial nurses typically run a clinic operation in a large factory setting. In addition to the everyday cuts and injuries, industrial nurses must be prepared for serious accidents and emergency situations. For this reason experienced RNs are usually desired for these positions. The hours and working conditions for industrial nurses are generally more attractive than hospital nursing, but the wage is somewhat lower.

The next three categories are those known to possess special educational requirements for entry. These areas are those that can be segmented from the larger hospital-dominated labor market (recall discussion in Chapter II) on the basis of noncompeting groups. The EDUC category refers to nursing education. Naturally nursing educators are employed in all of the RN educational programs that have been discussed here. Unlike the normal professional pattern, those RNs engaged in preparing the next generation of practitioners (i.e., the teachers) stand at the top of the earnings distribution. This seems to be a consequence of the fact that

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nursing education has the highest educational requirements. A Master's Degree is the desired preparation normally, but under shortage conditions, a Bachelor's Degree will sometimes suffice. Since this is not the normal preparation for the profession, a premium apparently must be offered to induce individual RNs to undertake the additional investment to qualify for these positions. This is not to suggest that a forty percent premium is required. There is undoubtedly some distortion present in this mean wage and the direction is upward due to the downward bias in hours of work reported. So while the estimate of the precise hourly wage may not be very accurate, nursing education is the highest paying sector of RN practice and that is unique.

The fact that school nursing ranks second in mean wage reinforces these conclusions. The work of a school nurse is similar to both industrial nursing and public health nursing except, of course, the patients are school children. Since school nurses work in organizations dominated by educators, it has become conventional in many places to pay them on the teachers' pay schedule and demand a Bachelor's Degree as minimum preparation. (There is also the public health content of school nursing, which justifies requiring training in public health nursing, normally an attribute of Baccalaureate graduates only.) On the other hand, there is some spurious differential introduced here also as a result of the work year issue discussed at the beginning of this chapter. At any rate it is clear that school nursing is a desirable sector of practice from the point of view of many, if not most, RNs. The pay is very good and the hours and working conditions are excellent.

Public health nursing also has educational demands beyond the minimal preparation for licensure. As was discussed in Chapter I, public health nursing is an area of preparation which most Diploma programs do not include in their curricula. The effect then is to limit the supply of public health nurses to those prepared in Baccalaureate programs. Tastes for public health nursing seem to vary a good deal among RNs. The public health nurse is an employee of a government agency or a quasi-governmental nonprofit agency, and generally enjoys a good deal of independence. She makes home visits to provide health care and health teaching for shut-ins, families on Welfare, etc. However, she may also be called upon to track down the contacts in a VD case. In short her work involves a good deal of contact with the general public, and usually in the patient's environs rather than a hospital or clinic. Clearly, some people find this prospect somewhat distasteful. The pay is good, the hours are good, but working conditions are of variable appeal.

The last employment sector is the remainder category. There is an impressive variety in this category, all the way from respiratory physician's assistant to camp nurse. There are nurse anesthetists, nurse consultants, nurse medical insurance examiners, prison nurses, nurse researchers and many others. Most of these areas are high wage areas, but the variance for this category is also quite high so the mean wage is not significantly different from the hospital wage.

Table 4-3 presents mean wages by another dimension of the job world, position or job title. The positions of staff nurse, head nurse, supervisor and director come directly from hospital termino-

Table 4-3

MEAN WAGE BY POSITION

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POSITION[1]	$\bar{W}$	s^2	n	differential
STAF	5.243	.582	377	reference
DIR	6.423	3.158	33	+22.51% **
SUP	5.962	1.050	76	+13.71% **
HEAD	5.569	.619	131	+ 6.22% **
OTHPO	6.203	2.495	96	+18.31% **
TOTAL	5.546	1.385	877	
MISSING			65	
GRAND TOTAL			942	

[1]The position titles are:
STAF = Staff Nurse; DIR = Director or Assistant Director; SUP = Supervisor or Assistant Supervisor; HEAD = Head Nurse or Assistant Head Nurse; OTHPO = Other positions.

$\bar{W}$ = mean wage; s^2 = variance of wage distribution; n = number of observations in the category. The differential column shows the percentage difference from the reference category and the asterisks indicate rejection of the null hypothesis:

$\bar{W}_i = \bar{W}_{reference}$ at the $\alpha = .05$ (*) or $\alpha = .01$ (**) level.

The test statistic is:

$$t = \frac{\left(\bar{X}_{ref} - \bar{X}_i\right)}{\sqrt{\left(s^2_{ref}/n_{ref}\right) + \left(s^2_i/n_i\right)}}$$

which is distributed as t(f) with degrees of freedom (f) given by:

$$f = \frac{\left(s^2_{ref}/n_{ref} + s^2_i/n_i\right)^2}{\frac{\left(s^2_{ref}/n_{ref}\right)^2}{n_{ref}+1} + \frac{\left(s^2_i/n_i\right)^2}{n_i+1}} - 2$$

logy but these terms seem to be used in other organizations as well, since the OTHPO category has remained manageable (or at least the RN respondents to this survey found it easy to represent their position in terms of the universally understood hospital structure). There is not much to be said about the results in Table 4-3 except that mean wages do follow the hierarchy of authority, all differences are statistically significant, and variance also rises with rising wages when viewed from this perspective.

Table 4-4 gives the mean wage by the employer type, i.e., type of ownership and control. Private, nonprofit employers are the reference category here. There is a clear ordering apparent as RNs who work for private, profit-making employers earn significantly less than those working for private, nonprofit ones. On the other hand, those working for public employers (Federal, state, and local governments) make significantly more. Of course it is apparent from the earlier discussions that this does not constitute a definitive test of wage differences by employer type since we know that the distribution of jobs will be quite different for these employer types. For instance, we learned in Table 4-2 that there were some 62 office nurses in the sample. These RNs work for physicians who are private, profit-making employers. Thus even if proprietary hospitals payed the same as voluntary hospitals (private for-profit and private, nonprofit employer types respectively), the measurement by employer type might show significant differences due to the addition of office nurses (a low wage sector) to the private, for-profit category. Similarly, school nurses and public health nurses are most often employed by local governments. Since

these are high wage sectors, they would tend to raise the mean local government wage in comparison with other categories.

The earlier discussion of job characteristics by sector of RN employment establishes reason to expect wages to differ by sector. Thus if the observed wage differences reflect compensating differentials or noncompeting groups we would not want to ascribe to the happenstance of employer type wage differentials arising from another force altogether. Yet there may also be wage differences due to type of employer per se. Employers may pay different wages for the same job depending on their particular institutional setting.[49] Thus the real point of Table 4-4 is to illustrate the necessity of multivariate analysis, where we can test the effect of employer type on wages while controlling for other wage determining variables.

Table 4-5 (on page 78 with Table 4-4) presents mean wage by another dimension commonly thought to influence wage levels, the size of the employer. Employer size is measured here by the number of employees, and as is apparent from the number of missing observations for this table, many RNs did not respond to this item (actually there were 57 nonrespondents on this item, almost as many as on the wage variable). Size was collected in more detail than the table indicates, with an original total of nine size categories.[50] It is clear that the reason for the high nonresponse

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[49]See Albert Rees and George P. Shultz, Workers and Wages in an Urban Labor Market (Chicago: University of Chicago Press, 1970) and the earlier work of Lloyd G. Reynolds, The Structure of Labor Markets (New York: Harper, 1951).

[50]See the questionnaire, item 21, in the Appendix for the actual question and the choice options.

Table 4-4

MEAN WAGE BY EMPLOYER TYPE

EMPLOYER TYPE[1]	$\bar{W}$	s^2	n	differential
PRIVNP	5.445	.833	364	reference
FED	5.960	.833	31	+ 9.46% **
STA	5.971	1.813	51	+ 9.66% **
LOC	6.159	1.997	174	+13.11% **
PROFIT	4.974	1.029	213	- 8.65% **
OTHEMP	5.969	1.934	38	+ 9.62% *
TOTAL	5.545	1.395	871	
MISSING			71	
GRAND TOTAL			942	

Table 4-5

MEAN WAGE BY EMPLOYER SIZE

EMPLOYER SIZE[2]	$\bar{W}$	s^2	n	differential
OVER 750	5.817	1.341	239	reference
251 TO 750	5.665	1.190	204	- 2.61%
51 TO 250	5.431	1.310	210	- 6.64% **
LESS THAN 51	5.142	1.414	180	-11.60% **
TOTAL	5.537	1.370	833	
MISSING			109	
GRAND TOTAL			942	

[1]The employer types are:
PRIVNP = Private non-profit; FED = Federal Government; STA = State Government; LOC = Local Government; PROFIT = Proprietary (private for profit): OTHEMP = Other employer types.

[2]Employer size is measured by the number of employees.

$\bar{W}$ = mean wage; s^2 = variance of the wage distribution; n = number of observations in the category. The differential column shows the percentage difference from the reference category and the asterisks indicate rejection of the null hypothesis;

$\bar{W}_i = \bar{W}_{reference}$ at the $\alpha = .05$ (*) or $\alpha = .01$ (**) level. See notes to Table 4-3 for the test statistic.

rate was confusion over the precise number of employees and/or confusion over exactly how the employer unit should be defined. The nine size categories were collapsed to the four in Table 4-5 for analytical convenience. Mean wages are positively correlated with employer size, and some of the differences are significant, but the same comments as on Table 4-4 apply here also. One really needs a multivariate analysis to determine whether employer size actually wields any influence in the RN wage structure.

Finally Table 4-6 brings us to the chief variable of interest in this analysis, RN education. The reference category is Diploma training and this category accounts for nearly sixty percent of the sample. All other RN education categories, except BSN, show mean wages that are significantly different from the Diploma mean wage. ADN grads earn some five to six percent less than Diploma grads on the average while Diploma grads who have gone on to complete a BS Degree (DIP-BS category) earn nearly eleven percent more than those who have not furthered their education. Recalling the results in Table 4-2 it is clear that the MS requirement in nursing education is reflected here in an enormous 42% wage differential favoring MS grads. The OTHED education group is an amalgam of about thirty individuals with Diploma training and an Associate Degree of some kind (presumably most of these people are on their way to joining the DIP-BS category) plus a few truly OTHEDs. The Diploma with ADN people did not appear to belong either with the DIP or the DIP-BS categories on the basis of their wage and hence, they were, in effect, thrown out by placement in the remainder category.

Let us consider the puzzle raised by the two comparisons we

Table 4-6
MEAN WAGE BY RN EDUCATION

RNED[1]	$\bar{W}$	s^2	n	differential
DIP	5.365	.917	504	reference
ADN	5.060	.475	103	- 5.68% **
BSN	5.565	1.265	104	+ 3.73%
DIP-BS	5.949	1.710	79	+10.89% **
MS	7.639	3.060	41	+42.39% **
OTHED	6.033	1.774	43	+12.45% **
TOTAL	5.545	1.390	874	
MISSING			68	
GRAND TOTAL			942	

[1]The education groups are:
DIP = Diploma; ADN = Associate Degree in Nursing; BSN = Bachelor of Science Degree in Nursing; DIP-BS = Diploma with Bachelor's Degree; MS = Master of Science Degree; OTHED = Other education.

$\bar{W}$ = mean wage; s^2 = variance of wage distribution; n = number of observations in the category. The differential column shows the percentage difference from the reference category and the asterisks indicate rejection of the null hypothesis:

$\bar{W}_i = \bar{W}_{reference}$ at the $\alpha = .05$ (*) or $\alpha = .01$ (**) level.
See notes to Table 4-3 for the test statistic.

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are most interested in, DIP with ADN and DIP with BSN. The first difference is negative and significant and the second is positive but not significant. So the gross wage differences are in the direction of length of training program, but particularly after the discussion of sectoral differences in wages, we would expect a BSN differential to show up. In fact, there is a good deal more reason to expect a BSN differential over the DIP reference than there is to expect a DIP differential over the ADN. And why should we find that BSN grads earn less on the average than DIP-BS? The key to these puzzles is years of working experience. The process of human capital formation does not stop when one leaves school, but continues on the job as experience exposes one to new situations which must be mastered. Thus we normally find that earnings rise year by year over at least most of the normal working life.[51] But recall from Chapter I that ADN programs did not exist before the early 1950's and even in California did not produce a significant number of graduates before about 1960. In fact, Table 4-7 shows that the mean years of working experience for ADN grads is less than one-third that of DIP grads. Furthermore, the maximum observed experience is only one-half as great, so not only is the distribution of experience for ADN graduates skewed toward zero, the whole distribution is truncated at roughly twenty years of experience.

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[51]The definitive work on the effect of work experience on earnings is the unpublished paper by Jacob Mincer, "Schooling, Experience and Earnings." This should be forthcoming from NBER shortly. For other references, see Mincer, "The Distribution of Labor Incomes: A Survey," Journal of Economic Literature, 8:1-26, March, 1970.

Table 4-7

WORK EXPERIENCE BY RNED

RNED[1]	YEARS OF WORK EXPERIENCE			n
	MEAN	STANDARD DEVIATION	MAXIMUM	
DIP	16.1	9.22	41	543
ADN	4.5	4.02	21	107
BSN	8.0	5.93	30	109
DIP-BS	15.0	9.78	40	84
MS	15.4	10.34	37	46
OTHED	16.5	9.62	39	48
MISSING				7
TOTAL				942

[1]The education groups are:
DIP = Diploma; ADN = Associate Degree in Nursing; BSN = Bachelor of Science Degree in Nursing; DIP-BS = Diploma with Bachelor's Degree; MS = Master of Science Degree; OTHED = Other education.

Thus the ADN grads do not have the full range of years of working experience that DIP grads do and one would expect their wage distribution to reflect this concentration at low experience levels. This is borne out by the low variance of the ADN wage distribution shown in Table 4-6. So while ADN grads do show significantly lower wages, an unknown proportion of this difference is due to their lack of working experience and thus the conclusion must be weakened. Again the need for multivariate analysis is demonstrated. We need to compare average wages of ADN and DIP grads controlling for the influence of years of work experience.

Somewhat the same points can be made for the BSN education group. Table 4-7 shows that BSN grads have about half as much work experience as DIP grads on the average, but the maximum here rises to about three-fourths. So while the contrasts are less extreme for BSN, the direction of bias in looking at gross mean wages is the same. Both ADN and BSN wages will be biased downward relative to DIP grads as a result of limited work experience. So while the gross wage comparisons show a significantly lower wage for ADN and an insignificantly higher wage for BSN, these results are not conclusive. Firmer conclusions must await the multivariate analysis of the next chapter.

Chapter V

RN WAGE STRUCTURE - MULTIVARIATE RESULTS

Our primary interest here is in determining whether RNs of differing educational preparation are perfect substitutes for each other, i.e., whether they are the same factor of production. We showed in Chapter II that under neoclassical perfect market conditions, this could be reduced to a simple question of relative wages in the markets where these RNs are hired. But then we saw in Chapter IV that simple tests of mean wages are not sufficient for this purpose due to the multiple influences on wages, and therefore a multivariate analysis was indicated. An ordinary reduced form wage equation with the wage regressed on the set of personal characteristics generally thought relevent in explaining the earning power of individuals would serve this purpose, but there are a number of reasons why this model was not employed here in the first instance.

First, it would be possible with such an approach to find that there were no significant differences in wages even if the three types of RN were not perfect substitutes. Suppose, for instance, that only BSN grads were employed as school nurses (a high wage sector) and office nurses (a low wage sector). If the proportion of BSN grads employed in each of these sectors happened to offset each other in such a way that the BSN mean wage was not significantly different from the DIP mean wage, the reduced form wage

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equation would not alert us to the differences in distribution and we would be led to believe incorrectly that BSN and DIP Registered Nurses were perfect substitutes. On the other hand, if significant differences in wages between RN educational groups were established, this result would not be completely satisfying either. One would immediately be led to ask, "Where do the differences come from? Are there consistent educational differentials paid in all sectors, or do the differences result from differing distribution of RNs among the sectors?"

We also saw in Chapter II that there are significant imperfections in the RN labor market. A reduced form wage equation analysis is not tolerant of imperfections in general, since it depends heavily on the market outcome and is not amenable to modification to allow market results to be checked against other evidence; it is an all-or-nothing strtegy. This is particularly troublesome when so little is known about the total RN wage structure. There are periodic surveys of earnings of RNs in various sectors individually, but the only data source covering all RNs simultaneously is the decennial Census, and it is not sufficiently attuned to nursing categories to be useful for studying RN wage structure. Thus on the twin grounds that it is more descriptive and more flexible (less sensitive to the assumptions of neoclassical market theory), a two-equation model of the Registered Nurse job world is used here.[52]

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[52]The basic inspiration for this formulation of the model came from the recommendations of my oral examination committee. Thanks are due to Professors Frank Levy, Theodore Keeler, Stephen Peck, Lovell Jarvis and Richard Bailey.

The RN wage structure is represented in equation (1) where the wage paid for a particular job is expressed as a function of a vector of attributes which describe that job. Among these are the geographical location (labor market), the sector of nursing practice (i.e., hospitals, public health, nursing education, etc.), the job title, the size and type of employing unit, the status of the job as regards shift work, part-time work, and collective bargaining.

$$(1) \qquad W = f(Z)$$

Thus the wage is associated with the job and not with the individual occupying the job at a particular time. The only personal characteristics which enter this wage equation are seniority with the employer (since there are frequently annual wage increments with length of service) and educational preparation (since, as for school teachers, there may be explicit wage differentials associated with educational accomplishment). This equation will serve two basic functions: it will provide the framework for testing the first set of hypotheses about RN education, namely whether the wage for a given job is the same regardless of education and secondly, it will constitute a multivariate analysis of RN wage structure which will provide a more complete and consistent picture of RN wage relationships than has been available up to this time.

The second equation expresses the probability of occupying a given job as a function of the personal characteristics of individuals. Conceptually, all characteristics that might be apparent to an employer or that might affect the tastes of the individual job seeker are relevant here. Empirically, the important factors

will be education, work experience, sex, ability, and health.

$$(2) \qquad p(JOB) = g(X)$$

Thus this second equation tests substitutability more directly by testing whether the probabilities that RNs of different educational backgrounds will be working in a given job area are the same. If the two types of RN are found to have the same probability of working in <u>each</u> job area and there is no wage differential paid by education, we can conclude that employers regard these two types of RN as one factor.[53]

Table 5-1 presents the ordinary least squares regression estimate of equation (1), the wage equation. The dependent variable used in equation (1) is the natural log of the hourly wage. All the independent variables except one are dichotomous, so the means of the independent variables give the proportion that "class" is of the whole sample. Within most variable groups there is one omitted category that serves as a reference, as in Chapter IV. Thus the coefficients typically measure wage deviations from this reference accompanying the presence of alternative conditions. Since the dependent variable is the log of the hourly wage, these deviations are in percentage terms.

The first group of variables represents the labor market where the wage question is observed.[54] The reference category is the San

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[53]This assumes that there is no reason to expect the preferences of the individual RNs for the various job areas to vary with education.

[54]Because of the space demands of the regression results themselves, the abbreviated variable names introduced in the tables of Chapter IV will no longer be keyed in each table. Please refer back to Chapter IV for the translations where needed.

Table 5-1

REGRESSION OF LOG OF HOURLY WAGE
ON JOB CHARACTERISTICS

$\bar{X}$	INDEPENDENT VARIABLES	b	se	
.202	SFO	reference category		
.059	ANAH	-.0653	.0232	**
.323	LA	-.0363	.0142	*
.040	RIV	-.0919	.0269	**
.035	SBOX	-.0652	.0286	*
.068	SD	-.1683	.0220	**
.072	SJ	-.0927	.0210	**
.031	SRVN	-.0932	.0297	**
.049	SAC	-.0824	.0243	**
.029	STOCMO	-.0739	.0305	*
.030	FREHAVI	-.1280	.0300	**
.061	OTHLOC	-.0789	.0210	**
.623	HOSP	reference category		
.064	NSHM	-.1204	.0239	**
.050	CLIN	-.0180	.0237	
.070	OFFC	-.1547	.0267	**
.019	PVDY	.0177	.0365	
.016	INDL	-.0838	.0400	*
.036	EDUC	.2401	.0315	**
.035	SCHL	.0411	.0326	
.042	PHN	.0764	.0292	*
.045	OTHED	.0180	.0276	
.424	STAF	reference category		
.038	DIR	.1903	.0279	**
.090	SUP	.1193	.0186	**
.146	HEAD	.0547	.0150	**
.112	OTHPO	.0924	.0193	**
1.47	SENLN	.0571	.0057	**
.242	SHIFT	.0149	.0123	
.296	PART	.0222	.0114	
.382	COBARG	.0268	.0114	*

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Table 5-1 (continued)

$\bar{X}$	INDEPENDENT VARIABLES	b	se	
.417	PRIVNP	reference category		
.041	FED	.0789	.0255	**
.058	STA	.0111	.0222	
.196	LOC	.0369	.0152	*
.241	PROFIT	-.0057	.0154	
.026	OTHEMP	.1035	.0326	**
.285	OVER 750	reference category		
.244	251 TO 750	-.0186	.0161	
.250	51 TO 250	-.0646	.0149	**
.222	LESS THAN 51	-.0678	.0179	**
.580	DIP	reference category		
.114	ADN	-.0162	.0161	
.116	BSN	.0194	.0166	
.090	DIP-BS	.0593	.0181	**
.049	MS	.1749	.0265	**
.051	OTHED	.0218	.0228	
	CONSTANT	1.6195	.0208	**
	Summary Statistics			
n		879		
standard error of regression		.1341		
R^2		.5691		
sum of squared residuals		13.70		
mean square residual		.0180		
F		24.55		

Francisco-Oakland SMSA. So the first coefficient says that the general wage schedule for RNs is about 3.6% lower in the Los Angeles-Long Beach SMSA than in the San Francisco-Oakland SMSA. Futhermore the single asterisk indicates that this coefficient is significantly different from zero at the 5% level of significance. That is, one can reject the null hypothesis that wages for RNs are the same in San Francisco and Los Angeles. This wage differential can be compared to that of Table 4-1 to determine the impact of the multivariate analysis. In the case of the Los Angeles-San Francisco comparison, the mean wages differed by 2.7% in Table 4-1 but by 3.6% here in Table 5-1. Thus taking into account all the factors of the regression equation, this geographical differential widened slightly. Usually the result is the opposite; that is, normally the SFO reference would tend to have a "higher wage RN mix" due to high education levels, high technology medical industry, etc. Thus some part of the simple geographical wage differential of Table 4-1 is due to this different RN mix. In the multivariate analysis, where the effect of these factors is separately accounted for, the magnitude of the geographical wage differences would therefore be reduced.

The other coefficients of this group similarly measure the difference in wage scales between San Francisco-Oakland and various other labor market areas. Most of these coefficients are significant at the .01 level, indicated by the double asterisks. These coefficients are not of much inherent interest for the problem at hand but can be thought of as controlling for differences in the overall wage structure among various labor markets so as to facilitate the estimation of other more meaningful relationships.

The second group of variables represents the employment sector within nursing. The pattern here is the same as that seen in Table 4-2, but the magnitude of the effects is changed even more than in the case of the labor market variables. For instance, take the highest wage sector, nursing education. Table 4-2 showed a raw mean hourly wage differential of 43% over the hospital reference. But in Table 5-1 this differential is reduced to 24%. The earlier bivariate results were significantly distorted by intercorrelations among employment sector, education, labor market and other variables. Nevertheless the earlier pattern is generally confirmed. Office nursing, nursing homes and industrial nursing pay significantly less than hospital nursing, while nursing education and public health nursing pay significantly more. The major suprise is that according to Table 5-1, school nurses do not earn significantly more than hospital nurses, even though there was a 19% differential in Table 4-1. This differential apparently was due to their high education and seniority levels. We shall see in Chapter VI that school nurses tend to have more work experience than the average RN.

The next group of variables refers to position. These categories are operational only in the sectors of nursing characterized by larger organizations and formal job structures, particularly hospitals but also nursing homes, clinics, and public health agencies. In the case of office nurses, for instance, there is generally no hierarchical structure and hence, no position variable. The sectoral variable alone measures the wage of office nurses. The reference category for position is STAFF, representing primarily staff nurse or general duty nurse in the hospital setting. Wage

differentials of directors, supervisors, head nurses and others from the staff nurse wage level are indicated as positive and significant in each case. The only noticeable change here from the results of Table 4-3 is the reduction in the differential of the remainder category, OTHPO.

The next series of variables represents a different group of influences. The seniority (years of service with present employer) variable is the only continuous independent variable in this equation. Limited experiments with the specification of seniority indicated that the log form fit best.[55] This accords with expectations since the first few years of service are the most important in terms of on-the-job learning, and hence, increases in productivity. Thus a function that is increasing but at a decreasing rate is suggested. On the other hand, there is no expectation that seniority should become a liability at any point, so the log form is preferred to a quadratic specification.

Table 5-2 shows the relationship between seniority and hourly wages. Because of the complex structure of the omitted reference categories, the specific predicted wage refers to the effect of years of seniority on the wage of the reference group: a Diploma graduate working full-time as a day-shift staff nurse in a private, nonprofit hospital in the San Francisco-Oakland SMSA that has more than 750 employees but no collective bargaining agreement with its RNs. The complexity of the reference group only comes into play

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[55]The actual independent variable used here is the log of years of seniority plus one. This avoids the problem of trying to take the log of zero.

Table 5-2

EFFECT OF YEARS OF SENIORITY ON HOURLY WAGE[1]

SENIORITY	$\hat{W}$
0	5.05
1	5.25
2	5.38
3	5.47
4	5.54
5	5.60
6	5.64
7	5.69
8	5.73
9	5.76
10	5.79
15	5.93
20	6.01

[1]The predicted wage is for the effect of years of seniority on the reference group: a Diploma graduate RN working full-time as a day-shift staff nurse in a private, nonprofit hospital in the San Francisco-Oakland SMSA that has more than 750 employees and no collective bargaining.

when we need to generate a predicted wage from the regression equation. When our attention is confined to testing hypotheses within one group of variables, we can ignore the other reference categories, but for this purpose we cannot. This does not mean that the effect of seniority on wages depicted in Table 5-2 only applies to this reference group however. The regression coefficient represents the average affect of seniority on all RN wages, but it is necessary to specify one set of characteristics when we generate a predicted wage. At any rate, Table 5-2 shows that the major impact of seniority is felt in the first few years. Notice that half the total twenty-year increase in wages is realized in the first four years of seniority.[56]

It is important to note that these seniority wage increases are, in theory, separate from changes in position that might accompany lengthening tenure. The accuracy of this statement, however, depends on the precision in measuring jobs here. If we knew that we had perfectly represented every job in the RN job spectrum with the ten sectors and five position categories employed here, we could be rather confident about the "purity" of the seniority differential. However, given the difficulties of representing any job structure adequately in an abbreviated way, there are undoubtedly some distortions present here. To the extent that each job category represents, in reality, a small job ladder, part of the seniority effect on wages measures the movement up the job ladder within each of our job categories.

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[56] In the San Francisco Bay Area the collectively bargained contracts for RNs only provide longevity increases through four years of service.

The shift differential variable (SHIFT) standardizes for the hospital practice of paying a bonus for evening or night work. Note that this coefficient is not statistically significant. That is, on this evidence alone, it is not established that a shift differential exists. This is a good practical statistical lesson. While we know that a shift differential is paid in many institutions, the combination of the small size of that differential and its variability among employers or labor markets prevents our "proving" statistically that a differential exists.

The coefficient for PART indicates that part-time workers are paid slightly more on the average than full-time workers. The coefficient is not quite statistically significant, however. The effect of collective bargaining (COBARG) on wages also appears to be rather small. Those jobs covered by collectively bargained agreements (as reported by the RNs holding the jobs) pay about 2.5% more on the average than those not so covered. This difference is significant at the 5% level.

The next two groups of variables relate specifically to the employer. The first group is for ownership type of the employer; the reference is private, nonprofit. The coefficients show that the Federal Government pays considerably more and local governments slightly more than private, nonprofit agencies. The State of California and proprietary (for-profit) employers pay wages that are not significantly different from the reference. Major differences from the bivariate results of Table 4-4 include the elimination of apparently significant wage differentials for state government and proprietary employers. The former showed nearly a 10% greater mean

wage in Table 4-4 while the latter showed a slightly smaller negative differential. Both are shown to be artifacts in the multivariate analysis. There is also a considerable drop in the size of the differential paid by local government employess. These effects were expected, of course, as the differing distribution of employer types among the nursing sectors is well known. Thus controlling for nursing sector while looking at wage differentials by employer type would produce radical changes.

For the next group, size of employer (measured by the number of employees), the reference group is employers with more than 750 employees. There is variation in wage level by size of employer, but it does not appear to be continuous. The two largest size categories (OVER 750, and 251 TO 750 employees) cannot be distinquished from each other and the two smallest (51 TO 250, and LESS THAN 51 employees) can be distinguished from the larger reference group but not from each other. These results are basically in accord with those of Table 4-5 except that the smallest employer size differential is reduced. This probably reflects control of the office nurse, small proprietary employer intercorrelation in the regression analysis.

The last group of variables represents RN education. Only the MS and DIP-BS groups are paid significantly more than the DIPLOMA reference. The most interesting comparisons are, of course, the DIP with ADN and BSN. Table 5-1 shows that ADN nurses are paid 1.5% less on the average while BSN nurses are paid about 2% more on the average than Diploma RNs. In neither case is the difference statistically significant. Thus when controlling for the job, the

null hypotheses that ADN and BSN Registered Nurses are paid the same wage as RNs prepared in Diploma programs cannot be rejected. The bivariate results of Chapter IV are again contradicted. The much larger differentials of Table 4-6 are shown to result from the influence of the job distribution. There is no gross discrimination in wages between the three basic educational preparations; any differences between them lie in different access to job areas, not from differences in wages paid on the same job.

Recall that the crucial policy question is whether the ADN Registered Nurses can adequately replace the previously "standard" DIP Registered Nurse. Recall also that the bulk of RNs are employed in hospitals. Thus, to narrow the issue somewhat, can ADN nurses adequately replace DIP nurses in the hospital sector? In terms of equation (1), are there any within-job wage differentials by education for the hospital sector? Is there evidence of market discrimination reflecting underlying productivity differences in hospitals?

Table 5-3 shows the ordinary least squares regression estimate of equation (1) for the hospital sector alone. The variables remain the same except that there are no sectoral variables since sector is controlled with the selection of just the hospital sector for the regression. Changes in estimated coefficients from Table 5-1 are most noticeable in the labor market variables. In general the differentials are larger in Table 5-3. Apparently the wage differentials are greater across labor markets for the hospital sector than for all RN employment sectors as a whole. This probably reflects the different geographic extent of the markets by sector.

Table 5-3

REGRESSION OF LOG OF HOURLY WAGE ON
JOB CHARACTERISTICS FOR HOSPITAL SECTOR

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.198	SFO	reference category		
.069	ANAH	-.1332	.0240	**
.318	LA	-.0671	.0161	**
.033	RIV	-.1465	.0318	**
.040	SBOX	-.0959	.0298	**
.065	SD	-.2314	.0244	**
.069	SJ	-.0858	.0227	**
.036	SRVN	-.1267	.0302	**
.050	SAC	-.0833	.0263	**
.034	STOCMO	-.1110	.0304	**
.024	FREHAVI	-.2318	.0354	**
.065	OTHLOC	-.1506	.0254	**
.599	STAF	reference category		
.026	DIR	.1684	.0344	**
.098	SUP	.1351	.0197	**
.195	HEAD	.0587	.0145	**
.082	OTHPO	.1369	.0204	**
1.48	SENLN	.0551	.0063	**
.353	SHIFT	.0134	.0114	
.277	PART	.0081	.0126	
.409	COBARG	.0073	.0128	

Table 5-3 (continued)

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.588	PRIVNP	reference category		
.050	FED	.0693	.0245	**
.054	STA	.0087	.0240	
.152	LOC	.0118	.0152	
.149	PROFIT	.0084	.0163	
.007	OTHEMP	.0548	.0640	
.374	OVER 750	reference category		
.332	251 TO 750	-.0136	.0126	
.251	51 TO 250	-.0456	.0155	**
.044	LESS THAN 51	-.0966	.0267	**
.627	DIP	reference category		
.143	ADN	-.0229	.0158	
.101	BSN	.0274	.0177	
.069	DIP-BS	.0192	.0207	
.014	MS	.1388	.0452	**
.046	OTHED	.0334	.0246	
	CONSTANT	1.6605	.0221	**

Summary Statistics

n	547
standard error of regression	.1115
R^2	.5275
sum of squared residuals	5.72
mean square residual	.0124
F	16.05

Other differences are that the part-time differential and collective bargaining differential decline considerably in size, implying that these coefficients reflected comparisons between sectors rather than variation within the hospital sector. (This turns out not to be the case for collective bargaining as we shall see later on.) Local government hospitals do not pay more than voluntary hospitals; the only significant coefficient left in this group is for the Federal Government, but the meaning of this differential is unknown. The size of employer variables show more uniform variation across categories than before, and a progression of wages with size of hospital is now apparent.

In the RN education variables the only real change is in the DIP-BS coefficient; it is still positive but no longer significantly different from zero. Once again the conclusion is that the wages paid to ADN and BSN Registered Nurses are not significantly different from those paid to Diploma RNs when the job is the same. The null hypotheses are not rejected.

Before passing on to the results for the sectoral distribution of RNs however, one further slice of the data should be examined. By extension of the argument that hospital nursing is the central arena wherein educational changes must work themselves out, especially as between ADN and DIP nurses, one can also argue that the most direct comparison possible would be within the largest job aggregation in the profession, the hospital staff nurse. Accordingly, Table 5-4 presents the estimated coefficients of equation (1) with the sector constrained to hospital and position conconstrained to staff. Notable differences between these coeffi-

cients and those of Table 5-3 include the appearance of a statistically significant shift differential and the restoration of the significance of collective bargaining. Presumably these effects were masked when the rest of the hospital nursing personnel were included. One would not expect to find as many supervisors or head nurses working shifts or being covered by collectively bargained agreements. The Federal Government appears even more generous in this regression with wages for hospital staff RNs, some 11% higher than in voluntary hospitals. The local government hospitals appear to pay less for staff RNs than voluntary hospitals, but the difference is not significant. There is also considerably less wage variation with size of employer once the fifty-employee threshold is passed.

The slight reduction in size of the seniority coefficient from that in the earlier results is very reassuring. Since the job is measured more precisely in this regression than in earlier ones, the small change in size of the seniority coefficient indicates that "deficiencies" in job measurement earlier are not too serious (provided one accepts the underlying assumption that longevity increases are similar throughout the profession). Since the chief job measurement deficiency is thought to result from movement within the broad job categories, this would tend to be manifested in a higher coefficient on the continuous seniority variable when job control is less adequate. However, this comparison indicates this is not a significant problem.

Coefficients for RN education once again reinforce the earlier conclusions. Given the job, there are small but <u>not</u> statistically

Table 5-4

REGRESSION OF LOG OF HOURLY WAGE ON
JOB CHARACTERISTICS FOR HOSPITAL STAFF NURSE

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.246	SFO	reference category		
.063	ANAH	-.0704	.0272	*
.295	LA	-.0599	.0178	**
.026	RIV	-.1732	.0389	**
.032	SBOX	-.1153	.0369	**
.077	SD	-.1934	.0258	**
.089	SJ	-.1033	.0227	**
.032	SRVN	-.0829	.0355	*
.054	SAC	-.0876	.0280	**
.020	STOCMO	-.1091	.0429	*
.023	FREHAVI	-.1829	.0402	**
.043	OTHLOC	-.1596	.0325	**
1.24	SENLN	.0454	.0070	**
.437	SHIFT	.0278	.0123	*
.378	PART	.0093	.0128	
.469	COBARG	.0314	.0148	*
.612	PRIVNP	reference category		
.052	FED	.1106	.0274	**
.047	STA	-.0001	.0284	
.146	LOC	-.0229	.0171	
.137	PROFIT	-.0041	.0186	
.006	OTHEMP	.1216	.0811	

Table 5-4 (continued)

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.426	OVER 750	reference category		
.315	251 TO 750	.0044	.0139	
.210	51 TO 250	-.0138	.0177	
.049	LESS THAN 51	-.0802	.0288	**
.606	DIP	reference category		
.186	ADN	-.0292	.0160	
.103	BSN	.0084	.0237	
.066	DIP-BS	.0257	.0201	
	CONSTANT	1.6430	.0235	**

Summary Statistics

n	331
standard error of regression	.0964
R^2	.4889
sum of squared residuals	2.43
mean square residual	.0093
F	9.60

significant differences in wages paid to ADN and BSN Registered Nurses when compared to the traditional Diploma RNs. Thus the task of differentiating the educational preparations will fall to equation (2), the probability of holding a particular job as a function of personal characteristics, especially type of RN education.

Chapter VI

THE SECTORAL DISTRIBUTION OF RNs

In this chapter we will examine the distribution of RNs among the various sectors of nursing practice. We found in Chapter V that there are no significant differences in wages paid to RNs of different educational backgrounds when we control for the jobs they hold. But what is the impact of RN education in obtaining those jobs? Table 6-1 shows the cross-tabulation of employment sector by RN education. Thus it constitutes a first crude look at the flows of RNs into different job areas. It only takes into account the effect of one variable, RN education, in determining the employment sector, but it will serve as an introduction to the more detailed analysis to follow.

The first number below the actual cell count gives the proportion of the RNED category working in the given employment sector. Thus reading across the HOSP row, we see that the proportion working in hospitals varies from .776 of ADN grads to .174 of MS grads. Over two-thirds of DIP grads and about half of DIP-BS and BSN grads also are employed in the hospital sector. The second number below the cell count gives the proportion which that particular RNED group is to the total RN usage for the employment sector represented by that row. Thus, again for the HOSP sector, DIP grads constitute 62.7% and ADN grads 14.3% of the total number of RNs in

Table 6-1

EMPLOYMENT SECTOR BY RN EDUCATION [1]

	DIP	ADN	BSN	DIP-BS	MS	OTHER	TOTAL
HOSPITAL	365	83	59	40	8	27	582
	.675	.776	.541	.488	.174	.563	
	.627	.143	.101	.069	.014	.046	.624
NURSING HOME	44	3	4	7	2	0	60
	.081	.028	.037	.085	.043	0	
	.733	.050	.067	.117	.033	0	.064
CLINIC	31	7	1	3	3	2	47
	.057	.065	.009	.037	.065	.042	
	.660	.149	.021	.064	.064	.043	.050
OFFICE NURSING	44	8	8	4	1	0	65
	.081	.075	.073	.049	.022	0	
	.677	.123	.123	.062	.015	0	.070
PRIVATE DUTY	15	1	0	2	0	0	18
	.028	.009	0	.024	0	0	
	.833	.056	0	.111	0	0	.019
INDUSTRIAL NURSING	14	0	0	0	0	1	15
	.026	0	0	0	0	.021	
	.933	0	0	0	0	.067	.016

Table 6-1 (continued)

	DIP	ADN	BSN	DIP-BS	MS	OTHER	TOTAL
NURSING EDUCATION	2	0	5	6	17	4	34
	.004	0	.046	.073	.370	.083	
	.059	0	.147	.176	.500	.118	.036
SCHOOL NURSING	3	1	10	6	8	4	32
	.006	.009	.092	.073	.174	.083	
	.094	.031	.313	.188	.250	.125	.034
PUBLIC HEALTH	5	0	14	13	2	4	38
	.009	0	.128	.159	.043	.083	
	.132	0	.368	.342	.053	.105	.041
OTHER	18	4	8	1	5	6	42
	.033	.037	.073	.012	.109	.125	
	.429	.095	.190	.024	.119	.143	.045
TOTAL	541	107	109	82	46	48	933
	.580	.115	.117	.088	.049	.051	

[1]The actual cell count is followed by the proportion that cell is to the column total and then by the proportion that cell is to the row total.

this sample who are employed in hospitals. Since the sample is random, this proportion serves as an estimate of the educational composition of the RN input to each sector of employment reported here.

One of the messages of Table 6-1 is that there are very few hard and fast rules about the connections between the RN job world and RN education. Ignoring private duty nursing and industrial nursing, the two smallest sectors, there are very few zero entries in the Table. Thus there are some people who seem to find their way into each sector regardless of education. Of course the job information was self-reported and there are bound to be some differences in classification compared to what an independent observer might report. But even for the sectors thought to be most rigid in terms of degree consciousness - school nursing, nursing education, and public health nursing - there are some Diploma grads who report they are employed in these areas. The proportions are small but they do not appear to be zero.

On the other hand some of the general tendencies reported earlier can also be demonstrated. Note that a markedly higher proportion of MS grads are employed in nursing education than any other education group. While only 5% of RNs in the sample have MS Degrees, they constitute half the input to nursing education. Something like 80-85% of school nurses and public health nurses have at least a Bachelor's Degree (depending on the composition of the other education category), while Diploma grads make up the overwhelming majority of industrial nurses and private duty nurses. Nursing homes, clinics, and office nursing appear to exert some

pull on all the education groups, reflecting the earlier suggestion that there are no barriers of non-competing groups here. Distribution of RNs among these areas is accomplished primarily through market forces, with both pecuniary and non-pecuniary factors at work. But let us move on to consider the influence of factors other than RN education in forging the links between the educational preparation of the RN and the RN job world. In particular, can we be more precise about the comparisons between the basic educational types - Diploma, Associate Degree and Baccalaureate? Is the difference between the proportions of DIP and ADN grads flowing into hospital employment a result of the differences in educational preparation, or is it explained by some other factor?

Table 6-2 gives the maximum likelihood estimates of the coefficients in a probit model of the probability of employment in the hospital sector. Probit analysis involves a monotonic transformation of probabilities from their unit interval distribution to a distribution with range $-\infty$ to ∞, with value 0 at $p = .5$.[57] This avoids the serious econometric problems associated with the linear probability model (namely heteroscedasticity and violation of the unit interval), but has the slight disadvantage of making

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[57]Henri Theil, Principles of Econometrics (New York: Wiley, 1971), pp. 628-32 has the best short discussion of the principle of the probit transformation and the probit specification. D. R. Cox, Analysis of Binary Data (London: Methuen & Co., 1970) is the standard reference for nonlinear probability models. For the probit transformation, see pp. 26-29, especially the very interesting table on p. 28 comparing alternative transformations of the probability interval. See Chapter 6 of this same volume for a discussion of maximum likelihood estimation of nonlinear probability models.

the direct regression estimates difficult to interpret without retransformation.

If we write p(x) for the probability that a given RN will be employed in a hospital and

$$p(x) = F(\beta X)$$

for the dependence of that probability on a vector of characteristics (X) representing the personal attributes of that nurse, then the probit specification is

$$p(x) = F(\beta X) \equiv \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta X} e^{-\frac{1}{2} u^2} \, du$$

or,

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$$F^{-1}(p(x)) = \beta X.$$

So the actual independent variable for the maximum likelihood estimates is the inverse of the cumulative normal distribution, and the β's emerge in terms of what are commonly called z scores, i.e., standard deviations from the mean (or in this case from the reference group mean). To retransform the estimated coefficients into probability terms, it is necessary to generate the $F^{-1}(p(x))$ value using the fitted equation, then take this predicted standard normal ordinate to a cumulative normal distribution and retranslate into probabilities. This process is further complicated here by the structure of the reference group. Because most of the independent variables are also bivariate, to avoid singularity of the X'X matrix and hence, its insolubility for the β regression coefficients, there must be at least one omitted category for each set of variables. Otherwise one of the variables would be a linear combina-

tion of some set of the other. Take SEX for example. If both male and female were included as explanatory variables (components of the β matrix), the matrix could not be inverted and the regression estimates made because the proportion male is just the complement of the proportion female (proportion male plus proportion female equals one), and hence, these two variables are not independent. Thus to make the problem workable, the female category has been omitted. This causes the effect of being female to be included in the constant terms.

The replication of this principle on a number of different variables leads to a constant terms that grows to have a rather complex interpretation. The constant term in Table 6-2 for instance (1.1136) is the standard normal ordinate of the probability of working in a hospital for the following reference characteristics: a Diploma grad, with no experience and no years out of the labor force, who is female and in good or excellent health, who did not rank in the top 5% of her high school class, who was trained in the U.S. and who works full-time. This standard normal ordinate translates into the probability, p = .867.

This structure is not so cumbersome as it seems at first and by judicious choice of the reference group, so that it represents the "norm" in some sense, it is made moderately workable. Inspection of the means of the independent variables in Table 6-2 shows that in each case the reference category is the dominant one. That is, females vastly outnumber males, those in good or excellent health vastly outnumber those in fair or poor health, those not in the top 5% of their high school graduating class outnumber those who were,

those trained in the U.S. outnumber those trained abroad, and those working full-time outnumber those working part-time. Thus in each case the variable represents the presence of an "unusual" condition.

Similarly for RN education, Diploma training is the traditional way of preparing RNs and it is still dominant in the pool of practicing RNs. Thus it seems appropriate to measure the other educational preparations as departures from this norm. This formulation is particularly attractive since the null hypothesis that ADN and BSN grads are perfect substitutes for DIP grads is then tested with a simple t test on the coefficients for ADN and BSN respectively. The hypothesis that ADN grads are indistinguishable from DIP grads in practice translates into the simple proposition (given that the RNs' tastes are similar across educational groups and recognizing that there may be problems of measurement error) that the probability of employment of ADN and DIP grads in each sector is the same. But if the null hypothesis is true (i.e., cannot be rejected), this means that the regression coefficient for ADN is zero, i.e., the probability of ADN grads being employed in a given sector is the same as the reference Diploma grads. So the null hypothesis is tested for each employment sector simply by the test of whether the ADN coefficient is significantly different from zero.

To return to the probit regression results of Table 6-2, the first six variables represent the effects of the now familiar RN education categories on the probability of employment in the hospital sector. The estimated coefficients indicate that all RNED groups except ADN are significantly less likely than the DIP grads

Table 6-2

PROBABILITY OF EMPLOYMENT IN HOSPITAL
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(HOSP)	.6258		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	- .1142	.1712	
.1136	BSN	- .6438	.1505	**
.0857	DIP-BS	- .5165	.1588	**
.0501	MS	-1.5672	.2379	**
.0512	OTHED	- .4097	.1990	*
13.67	EXPER	- .0284	.0054	**
3.82	OUTLF	- .0375	.0079	**
.0223	MALE	- .1390	.3080	
.0178	HLTH	- .8953	.3591	*
.2661	ABIL	.0949	.1029	
.0379	PHILL	.7532	.2844	**
.0512	ENGCAN	.1235	.2105	
.0256	OTHFOR	.3990	.3142	
.2973	PART	- .1836	.0998	
	CONSTANT	1.1136	.1297	**

n = 898

log of the likelihood function = -525.56

(-2) X log likelihood ratio = 136.27 ** with 14 df

to work in a hospital. The sign of the ADN coefficient is negative also, but we cannot reject the hypothesis that this coefficient is zero. Hence, we cannot reject the hypothesis that ADN grads are just as likely as DIP grads to be working in a hospital.

Table 6-3 gives the probability estimates derived from the equation of Table 6-2, i.e., the "retransformed" probabilities. The standard normal ordinate column gives the regression prediction for that category straight from the equation in Table 6-2. Thus the predicted ordinate for DIP is 1.114 or the constant term of the regression (since DIP is the reference group), and Table 6-3 gives the probability translation $\hat{p}$ = .867 of this ordinate from the cumulative normal distribution. Similarly the ADN ordinate is .999 (1.113 - .114 = .999) and its probability translate is $\hat{p}$ = .841. The lack of asterisks next to the ordinate indicates that this coefficient was not significantly different from zero in Table 6-2 and hence, the difference between the $\hat{p}$ for ADN and DIP is not significant.

It also should be pointed out that only one group is allowed to vary at a time in Table 6-3. Thus when comparisons are being made between RNED categories, the reference values for all other variables in the regression are assumed. These values are already "built-in" to the constant term for the regression and so it is most convenient to structure the presentation this way. This means that when we go on to other variables, we will be assuming the DIP education group when we generate the actual ordinate and predicted probability level. This is purely a matter of expository convenience, however, and does not mean that the coefficients were

fitted only on the basis of the reference group. When we consider the next variable of Table 6-2, years of RN working experience, for instance, the fact that the predicted probabilities given in Table 6-3 refer to the effect of experience on the probability that a DIP nurse (who is female, in good or excellent health, etc. - i.e., the reference group) will work in a hospital does not mean that this pattern only applies to DIP nurses.

In fact, the estimated regression coefficient for EXPER in Table 6-2 represents the average effect of years of experience on the probability of working in a hospital without regard to type of education. We could as easily have chosen another reference category for RNED, or even with the same structure in the equation of Table 6-2, we could have expressed the estimated probabilities of Table 6-3 in terms of another education group. So the particular values for $\hat{p}$ that are given in Table 6-3 are illustrative; they represent a selection from the large number of possible presentations. The model itself is not so narrow, however, and one can generate $\hat{p}$'s for any group of individual characteristics that may be of interest. If the probability that a male, Diploma grad from the Phillipines with ten years working experience, etc., will be working in a hospital is desired, the regression results of Table 6-2 will generate the standard normal ordinate for that constellation of characteristics and a cumulative normal distribution will give the probability translation of that ordinate. This process will work similarly for any other combination of variables present in the regression model. Caution should be exercised, however, for a number of reasons. First, the characteristics must be chosen

with some care as the regression equation will generate predictions for groups that do not exist just as easily as for groups that do. That is, if one puts together the predicted probability of working in a hospital for a male BSN graduate trained in England, etc, there is no guarantee that such a person exists. In fact, there are no BSN programs in England.

It should also be kept in mind that the regression coefficients represent the "average" effect of the variables when considered independently. Interactions among the variables are not allowed. Thus the model assumes that the effect of years of experience on the probability of working in a hospital is the same for all education groups. This may not be the case, in fact. Unfortunately, the the sample size in the ADN and BSN educational categories is not sufficient to permit an adequate investigation of this issue. Besides, since the ADN and BSN groups do not have the full experience range that the other educational groups have (recall Table 4-7 and its discussion), it would still be necessary to hypothesize about the effect of experience over part of its range. A crude check on the maintained hypothesis of equal experience effects will be presented in Chapter VII when the application of this same model to a sample with a truncated experience distribution is discussed.

Another area for caution lies in the precision of the estimates. Careful attention should be paid to the standard errors of the variables in Table 6-2. Otherwise one can be lulled into supposing a greater precision than actually exists. This is particularly important in those cases where the coefficient is large absolutely, but also has a large standard error. There are no such

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cases in Table 6-2, but a good many will be encountered later on in this chapter. This circumstance usually reflects a very small number of observations underlying the estimate. Needless to say, little confidence should be placed in such a result even though it may appear large. For this reason, when the results for the remaining employment sectors are presented here, only the variables of direct and continuing interest (RN education and experience variables) will be translated into probability terms without regard to their significance.

Returning to the discussion of the probability of employment in the hospital sector (Tables 6-2 and 6-3), the next two variables represent the RN's work experience. EXPER is simply the years of RN working experience and OUTLF is the number of years out of the labor force since completion of basic RN training.[58] The role of work experience is finally beginning to take its rightful place in general human capital work.[59] Generally speaking, the difficulties have been on the empirical side as Becker himself laid down the theoretical importance of work experience in his original 1962 article.[60] The contrast between the difficulty of measuring work

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[58]See Questionnaire, item 4, in the Appendix for the question on EXPER. OUTLF is the difference between EXPER and years elapsed since completion of basic nursing program, Questionnaire, item 3.

[59]Again the unpublished Mincer monograph, "Schooling, Experience and Earnings," is the best example. However, see Albert Rees and George P. Shultz, Workers and Wages in an Urban Labor Market (Chicago: University of Chicago Press, 1970), especially Chapters 7 through 12 for an excellent empirical effort.

[60]Gary Becker, "Investment in Human Capital: A Theoretical Analysis," JPE, 70 (Supplement):9-49, October, 1962. See also Jacob Mincer, "On-The-Job Training: Costs, Returns, and Some Implications," JPE, 70 (Supplement):50-79, October, 1962.

experience or on-the-job training as opposed to schooling made it inevitable that the schooling side would be developed first empirically. Besides, standard data sources do not include measurements of work experience and hence, potential experience (derived from current age and hypothetical age of leaving school) is usually the best that is available.

The measure here should be quite reliable, subject to the difficulties of recollection on the part of the respondent. To minimize this factor the question on years of working experience was placed immediately following the question on year of graduation from basic nursing program. Thus the respondent should have started from a precise factual basis at least. In general it would be preferable to have a detailed work history, although this may be somewhat less important in a profession like nursing where the promotion ladder is not long, but subject to the practical constraints of mail survey techniques and given the difficulty of dealing with work histories analytically, this measure is quite satisfactory. The OUTLF variable, years out of the labor force, is also a potentially valuable one, especially when dealing with a predominantly female profession (where continuous work experience cannot be assumed) and where there is some question of obsolescence.

In fact, in the regression results of Table 6-2, both these variables put in a strong showing. They are both negative and significantly different from zero. It is unusual to find that these two variables, one of which conceptually represents additions to human capital, the other depreciation of it, will have the same sign. In the normal earnings function they should not. But the

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dependent variable here is the probability of working in a hospital. The coefficient for EXPER is negative because of the steady flow out of hospital nursing accompanying increasing experience. We saw in Chapter III that the hospital is the dominant force in the market for RNs, but apparently this is even more true for neophyte RNs. This does make sense as hospitals are the large, visible employers and their hiring is pretty much continuous. Thus a new graduate would be likely to seek work at a hospital, due to information patterns and the lesser uncertainty in this market sector. Besides, hospital nursing experience is generally thought to be valuable by employers and they normally would prefer someone with some hospital experience, other things being equal.

But they do not stay there indefinitely. Whether due to the pressure, the shift work, the availability of other opportunities (which one is more likely to hear about in a hospital than anywhere else, the hospital being the hub of the health care system), or some other factor, there is a steady flow out of hospital nursing. Table 6-3 translates the negative regression coefficient of Table 6-2 into more meaningful terms. The probability of working in a hospital for the reference group declines from about .87 at graduation to .71 after twenty years and .60 after thirty years work experience. This is slightly under .01 (or 1% in proportion terms) per year. Further, the plot of the proportion working in hospitals versus years of working experience from the raw sample data shows this to be a steady linear decline year by year. This is the reason for the linear specification of experience in these regressions. Quadratic and log forms were fit with no improvement

in performance of the regression. While this is not the usual result, it must be repeated that this is not the usual human capital regression as it is fitted on a probability model and the alternatives do not constitute promotions in any sense. Later on when we look at a model where the alternatives are promotions, we will find the familiar quadratic specification of experience performs best.

The other experience variable, years out of the labor force, also is significantly negative and the estimated coefficient is even larger than for experience. This reflects the well-known reticence of RNs in returning to hospital work once they have left it.[61] Whether this represents actual obsolescence or imagined obsolescence is immaterial since in either case it is a real fear to the individual RN. Remember that RNs sometimes deal with life and death matters and the consequences of an error can be very serious indeed.

This pattern of experience effects could also result from a simple age process. Since chronologically an RN is either adding a year of nursing experience or a year out of the labor force each year of her life (assuming she doesn't leave nursing entirely), one could argue that the effects reported above are an artifact of the aging process. This is plausible in the case of hospital nursing. If you assume that the demands made on the hospital nurse are so heavy as to be unsustainable in the long run, there would be a process, based on the random variations in vigor or tolerance of the sort of demands that are made, which could produce this pattern of steady exodus. However, it is still preferable to measure age

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[61] See Chapter IV, p. 68.

in terms of work experience and years out of the labor force since they have more descriptive power than age alone. They also are clearly interpretable in labor market terms while age is not. Furthermore, as we move on to the probability of working in other nursing sectors, we shall find that this two-variable structure yields more insight than in the hospital case.

The remaining variables in the regression are personal characteristics which represent a series of minor hypotheses about the effect of these characteristics on labor market outcomes. They also represent control variables in the regression model. These factors were thought to be of possible importance in explaining the sectoral distribution of RNs, so they should be included in the model to prevent their influence from being ascribed to some other correlated variable. In general, the influence of these variables has turned out to be less important than expected, but this is useful information as well. The same variables were used in every regression for the sake of consistency, even though in some cases they did not promise very much a priori. For this first case of the hospital sector a complete accounting of these variables will be given. Thereafter attention will be called to these items only where they are particularly noteworthy.

The SEX variable tests whether the minority of male RNs (2.2% of the sample) are distributed differently among the nursing sectors from the female majority (female is the reference group). In the case of the probability of working in a hospital, there is no significant difference. This holds true for all but one of the remaining sectors, as well. Thus there is little evidence here to

support the contention that male RNs have different career patterns. That does not mean that they do not, just that we can't reject the null hypothesis that there is no difference. Given a larger sample and lower standard errors, this might not be the result.

The health variable, as Table 6-3 indicates, is structured to represent the presence of significant health problems. The reference is good or excellent health (over 98% of the sample) and the dummy variable HLTH appears for the 1.8% of the sample who reported fair or poor health. HLTH is negative and significant at the .05 level in Table 6-2. Table 6-3 shows that the regression results translate into a difference of nearly .3 in probability, with those in good or excellent health (and with other reference characteristics) having a predicted probability of .87 and those in fair or poor health a probability of .59 of working in a hospital. We can conclude that RNs with poor health are less likely to be employed in hospitals. This is probably a reflection of the job demands mentioned in Chapter IV; hospital nursing is hard work.

The ABIL variable represents an attempt to control for ability levels of graduates of different RN educational programs. If there is a marked difference in the average "quality" of beginning RN students in the different types of programs, one would expect to also find differences in the job market outcomes after graduation. More capable people should do better regardless of education, and if there is an association between the quality of student and the type of program, this would be a distorting influence in measuring the effects of the educational programs. But the question of correlation between ability and education is a troublesome one. This

is due not only to the ultimate difficulty of specifying exactly what ability is, but also because of conflicting evidence available on the quality of student inputs into the Registered Nurse educational process.

Bayer and Schoenfeldt, using Project Talent data, compared freshman nursing students enrolled in Baccalaureate and Diploma programs and found "generally negligible differences in measured aptitude and achievement between those in three-year and those in four-year programs."[62] Mary Ann Richards, in a study of graduating students in thirteen western shcools of nursing, found no significant differences among the three groups in intelligence, leadership potential, responsibility, emotional stability or sociability.[63] On the other hand, George Wren reported for a sample of freshman nursing students in Georgia significant differences among the SAT scores of students in the three types of programs in that state. He also showed that Baccalaureate students differ from the other two types in their average quartile rank in high school.[64] Finally, the NLN Nurse Career Pattern Study of entering freshmen in RN initial programs in 1967 found that 34% of ADN, 48% of Diplo-

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[62]Alan Bayer and Lyle Schoenfeldt, "Student Interchangeability in Three-Year and Four-Year Nursing Programs," Journal of Human Resources, 5:85, Winter 1970.

[63]Mary Ann Richards, "A Study of Differences in Psychological Characteristics of Students Graduating from Three Types of Basic Nursing Programs," Nursing Research, 21:258-61, May-June, 1972.

[64]G. R. Wren, "Some Characteristics of Freshman Students in Baccalaureate Diploma, and Associate Degree Nursing Programs," Nursing Research, 20:167-72, March-April, 1971.

ma, and 63% of Baccalaureate students reported they had ranked in the top quartile of their high school graduating class.[65]

The disagreement among these studies may be as much a matter of measurement instruments as anything else. The experimental design here ruled out the possibility of psychological testing, but rank in high school class was gathered. Becker considers class rank a measure of "a combination of intelligence, interest in schooling, and perseverance.[66] To the extent that ability, hard work, personality, cultural background, family income level and other such factors operate as selectors in school in a similar fashion to the way they operate in the job world, high school class rank will serve as an adequate summary measure of student input quality.

The ABIL variable refers to the self-reported high school rank of the RN. It is set up so that highly capable people (as reflected in high school rank) are represented in the dummy variable. The reference group is all those who did not report they were in the top five percent of their high school graduating class.[67] Thus the coefficient measures the impact on the probability of working in a hospital of good academic ability as measured by high school achievement. The fact that over one-fourth of the sample reported

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[65] From Student to RN (Bethesda, Md.: U.S. Department of Health, Education, and Welfare, DHEW Publication Number (NIH) 72-130, 1972), Table 11, p. 52.

[66] Gary Becker, Human Capital (New York: NBER, 1964), p. 79.

[67] Unfortunately it was necessary to include the non-respondents on this item in the reference category also due to the relatively high non-response rate here. This was judged preferable to throwing out all rank non-respondents from the regressions or omitting the variable from the analysis entirely.

they did rank in the top 5% probably represents something of an overstatement.[68] But this is not particularly troublesome since it is relative rank that is desired. So if everyone "cheats" by one class in reporting their rank, the measurement is just not as precise at the top. In this case it is not possible to slice finer than one-fourth of the sample. In any event the performance of this variable in the probability of job regressions is uniformly poor. The coefficient of ABIL is never significantly different from zero. Thus no connection between high school achievement and sector of nursing practice is demonstrated.[69]

The next set of three variables in the regression results of Table 6-2 represent the effects of training outside the U.S. The particular interest here was in determining the impact of training in the Phillipines. Rumor has it that Filipino nurses (trained in the Phillipines and licensed in the U.S. under reciprocity agreements), who make up roughly 4% of the employed RNs in our sample, are not treated the same as domestic RNs. The construction of the foreign training variables makes it possible to compare RNs trained in the Phillipines, RNs trained in England or Canada (i.e., English-speaking countries) and RNs trained in other foreign lands

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[68]Altman estimates that about half the professional nursing school entrants in 1967 ranked in the top quarter of their high school graduating class (p. 43). The basic data source is the NLN Nurse Career Pattern Study.

[69]Generally it has been found that academic ability does not correlate well with performance as an RN, so this result is not too surprising. See Edna Mae Brandt and Bettimae Metheny, "Relationships Between Measures of Student and Graduate Performance," Nursing Research, 17:242-46, May-June, 1968, and Jerry B. Saffer and Linda P. Saffer, "Academic Record as a Predictor of Future Job Performance of Nurses," Nursing Research, 21:457-62, September-October, 1972.

(i.e., not English-speaking) to those trained in the U.S. in terms of their distribution among the nursing sectors. The results of Tables 6-2 and 6-3 show that Filipino RNs are significantly more likely than U.S. trained RNs to work in a hospital. The coefficients of the other two foreign trained groups are positive but not significant. Thus this evidence does tend to support the hypothesis that something special is happening in the case of RNs trained in the Phillipines. We shall have more to say about this later when we consider the position or job title within the hospital sector. It should also be mentioned here that in no other nursing sector are any of these three variables significant.

The final independent variable of these probit regressions is PART, or part-time work schedule.[70] This refers to persons whose normal scheduled hours of work fall below 35 hours per week. Roughly 30% of the sample does work a part-time schedule but the coefficient is not significantly different from zero in the hospital sector equation. Under the maintained hypothesis that all part-time work schedules for RNs are chosen voluntarily, this variable represents a restriction of supply by the individual. There have been various complaints that hospitals in particular make it very unpleasant for part-time workers, thus contributing to the RN shortage, or at the very least not helping to solve it. By testing the sector distribution of part-time RNs, this variable helps shed some light on the job market consequences upon individuals of restricting the hours they are willing to supply. The coefficient of PART in Table

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[70] See Questionnaire, item 24 in the Appendix.

Table 6-3

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY OF EMPLOYMENT IN HOSPITAL
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	1.114	ref	.867
	ADN	.999		.841
	BSN	.470	**	.681
	DIP-BS	.597	**	.726
	MS	- .454	**	.326
	OTHED	.704	**	.758
YEARS OF EXPERIENCE	0	1.114	ref	.867
	5	.972	**	.834
	10	.830	**	.797
	20	.546	**	.709
	30	.262	**	.603
YEARS OUT OF LABOR FORCE	0	1.114	ref	.867
	5	.926	**	.824
	10	.739	**	.770
	20	.364	**	.641
SEX	Female	1.114	ref	.867
	Male	.975		.834
HEALTH	Good/Excellent	1.114	ref	.867
	Fair/Poor	.218	*	.587
ABILITY	Not top 5%	1.114	ref	.867
	Top 5%	1.019		.846
TRAINING SITE	U.S.	1.114	ref	.867
	Phillipines	1.867	**	.969
	England/Canada	1.237		.892
	Other foreign	1.513		.934
WORK STATUS	Full-time	1.114	ref	.867
	Part-time	.930		.824

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

6-2 is negative but not quite significant. At any rate, the probability translate in Table 6-3 shows that the effect is quite small.

One last point in interpreting these results on personal characteristics should be made here. With a single-equation model describing the RN job market results in terms of the probability of an RN working in a given sector as a function of her characteristics, we are not in a position to say whether the effect we observe is produced on the supply side or the demand side of the market. Take the case of Filipino RNs: while it may be tempting to claim that the fact that Filipinos are more likely to be employed in hospitals than other sectors is a result of discrimination against Filipinos in these other sectors, this evidence alone is not sufficient to justify that claim. It could be that Filipino RNs prefer hospital work and thus, do not apply for jobs in other sectors. One must combine the distributional effects given by the regression results with other evidence or, at minimum, explicit behavioral hypotheses (for example, Filipino RNs have the same preferences for work in the different sectors as U.S. trained RNs, or employers are indifferent to the location of training of RNs) to derive conclusions about causation. The concern here is in describing the market results and testing whether the result differs for different groups, particularly educational groups.

Table 6-4(a) gives the maximum likelihood estimates of the probit regression on the probability of working in a nursing home. Table 6-4(b) translates the regression results back into predicted probabilities for the education and experience variables. These two tables thus correspond to Tables 6-2 and 6-3 for the hospital

Table 6-4(a)

PROBABILITY OF EMPLOYMENT IN NURSING HOME
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(NSHM)	.0657		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	- .0968	.2978	
.1136	BSN	- .2738	.2619	
.0857	DIP-BS	.0838	.2267	
.0501	MS	- .1327	.3499	
.0512	OTHED	-1.9398	1.2622	
13.67	EXPER	.0097	.0084	
3.82	OUTLF	.0558	.0105	**
.0223	MALE	-1.3696	1.8445	
.0178	HLTH	.5127	.4214	
.2661	ABIL	- .0809	.1605	
.0379	PHILL	.3564	.3341	
.0512	ENGCAN	-1.9148	1.2908	
.0256	OTHFOR	- .1667	.4818	
.2973	PART	.2124	.1506	
	CONSTANT	-1.9363	.2123	**

n = 898

log of the likelihood function = -188.52

(-2) X log likelihood ratio = 58.27 ** with 14 df

Table 6-4(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN NURSING HOME
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-1.936	ref	.026
	ADN	-2.033		.021
	BSN	-2.210		.014
	DIP-BS	-1.853		.032
	MS	-2.069		.019
	OTHED	-3.876		0
YEARS OF EXPERIENCE	0	-1.936	ref	.026
	5	-1.888		.030
	10	-1.839		.033
	20	-1.742		.041
	30	-1.645		.051
YEARS OUT OF LABOR FORCE	0	-1.936	ref	.026
	5	-1.657	**	.049
	10	-1.378	**	.084
	20	- .820	**	.206

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

sector. Note that OUTLF is the only independent variable (aside from the constant) which has an estimated coefficient significantly different from zero. That is, the only one of our explanatory variables that is associated with working in a nursing home is years-out-of-the-labor-force. Table 4-6(b) shows that the probability of working in a nursing home is estimated to increase about eight-fold with the accumulation of twenty years out of the labor force. This clearly represents the pattern discussed earlier: the middle-aged RN returning to work after her child-rearing years who does not wish to accept the challenge (or is not offered the chance) of returning to the hospital, for whatever reason. RN education is not related to the probability of working in a nursing home, so the apparent contrasts of Table 6-1 (the cross-tabulation results) are a result of the age and experience distributions rather than education.

Tables 6-5(a) and 6-5(b) report the results for the probability of employment in a clinic. None of the explanatory variables are significant here and, in fact, the χ^2 test on the overall equation indicates that our model is not able to predict employment in a clinic better than could be done with no information at all about the individual. That is, the variables of the model are not associated with employment in a clinic. The conclusion is either that tastes of individuals or other factors not measured here determine this result, or that it is a random event and not susceptible to prediction.

Tables 6-6(a) and 6-6(b) give the regression estimates for the probability of working in an office. Once again none of the education terms is significant and, in particular, the probability of

Table 6-5(a)

PROBABILITY OF EMPLOYMENT IN CLINIC
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(CLIN)	.0512		
$\bar{X}$	INDEPENDENT VARIABLE	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	.1131	.2447	
.1136	BSN	- .7271	.3958	
.0857	DIP-BS	- .2122	.2809	
.0501	MS	.0767	.3063	
.0512	OTHED	- .1300	.3395	
13.67	EXPER	.0012	.0086	
3.82	OUTLF	.0134	.0118	
.0223	MALE	.3470	.4121	
.0178	HLTH	-1.8496	2.4448	
.2661	ABIL	.0660	.1611	
.0379	PHILL	-1.8477	1.7211	
.0512	ENGCAN	.0144	.3107	
.0256	OTHFOR	-1.8544	2.1643	
.2973	PART	- .1598	.1675	
	CONSTANT	-1.5997	.2001	**

n = 898

log of the likelihood function = -172.84

(-2) X log likelihood ratio = 17.31 with 14 df

Table 6-5(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERSITICS
ON THE PROBABILITY OF EMPLOYMENT IN CLINIC
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-1.600	ref	.055
	ADN	-1.487		.068
	BSN	-1.812		.035
	DIP-BS	-2.327		.010
	MS	-1.523		.064
	OTHED	-1.730		.042
YEARS OF EXPERIENCE	0	-1.600	ref	.055
	5	-1.594		.056
	10	-1.588		.056
	20	-1.576		.057
	30	-1.564		.059
YEARS OUT OF LABOR FORCE	0	-1.600	ref	.055
	5	-1.533		.063
	10	-1.466		.071
	20	-1.332		.092

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

working in a doctor's office cannot be shown to differ for DIP, ADN and BSN grads. Work experience is important however. Table 6-6(b) shows that the chances of working in a doctor's office are estimated to increase from .032 at graduation to .149 with thirty years of experience. Whether this is the result of preferences of individuals, physicians (i.e., employers) or both cannot be determined, as was previously explained.

An interesting contrast with the nursing home results is apparent here. In both cases age would be correlated with employment in the sector, but with our model we are able to show that the RNs working in offices do not tend to be those with long lapses in their labor market experience as was the case for nursing homes. Thus the "second-career" RNs tend to go to nursing homes rather than to office nursing. The part-time variable is significantly greater than zero for office nursing indicating that this is a sector which offers a good deal of part-time work (less than 35 hours per week, by our definition).

The regression results for the probability of working as a private duty nurse and the probability of working as an industrial nurse will not be presented. It is felt that the small number of observations in each case (18 and 15, respectively), and the limited educational distributions for these sectors (apparent in Table 6-1) make the results useless. We might note in passing that none of the educational coefficients were significant in these regressions, but the standard errors were high so this is not very surprising.

The regression results for the probability of working in nursing education are given in Tables 6-7(a) and 6-7(b). The RN education variables have come into play once again, but this time their

Table 6-6(a)

PROBABILITY OF EMPLOYMENT IN OFFICE NURSING
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(OFFC)	.0702		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	.1092	.2441	
.1136	BSN	.1606	.2181	
.0857	DIP-BS	- .3038	.2779	
.0501	MS	- .6373	.4365	
.0512	OTHED	-2.0184	1.3147	
13.67	EXPER	.0237	.0078	**
3.82	OUTLF	- .0005	.0119	
.0223	MALE	- .0715	.5390	
.0178	HLTH	.6151	.3951	
.2661	ABIL	- .1047	.1571	
.0379	PHILL	-1.8757	1.5475	
.0512	ENGCAN	- .0154	.3140	
.0256	OTHFOR	-2.0413	1.8233	
.2973	PART	.3309	.1403	*
	CONSTANT	-1.8517	.1962	**

n = 898

log of the likelihood function = -209.62

(-2) X log likelihood ratio = 37.03 ** with 14 df

Table 6-6(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY OF EMPLOYMENT IN OFFICE NURSING
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-1.852	ref	.032
	ADN	-1.743		.041
	BSN	-2.156		.015
	DIP-BS	-1.691		.046
	MS	-2.489		.006
	OTHED	-3.870		0
YEARS OF EXPERIENCE	0	-1.852	ref	.032
	5	-1.733	**	.042
	10	-1.615	**	.053
	20	-1.378	**	.084
	30	-1.141	**	.149
YEARS OUT OF LABOR FORCE	0	-1.852	ref	.032
	5	-1.854		.032
	10	-1.857		.031
	20	-1.862		.031
WORK STATUS	Full-time	-1.852	ref	.032
	Part-time	-1.521	*	.064

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

signs are positive in contrast to the hospital equation where they were negative. While ADN grads do not differ from DIP grads in the probability of being a nurse educator (Table 6-7(b) shows that the estimated probability is zero for both), all the other education groups are significantly more likely than DIP grads to be in this sector. The chances are still not very good unless one has a Master's Degree, however. Table 6-7(b) shows this probability estimated at about ten times as great as for those with Bachelor's Degrees.

Currently working toward an MS is also shown to increase the probability of being a nurse educator. This undoubtedly represents the situation where the position is granted temporarily (either formally or informally) conditional on completion of the MS at some future date. At any rate, working on a MS increases the probability of working in nursing education by about 1%. On the other hand, experience does not prove to be important. The degree is clearly the ticket to nursing education and it does not appear to be possible to substitute experience for formal training.

None of the other personal characteristics are associated with the probability of working in nursing education except part-time work. In particular, top high school rank has no effect whatever when controlling for education. It is possible that academic talent may count but that the aggregate design here hides the relationship. That is, it could be that if we allowed interaction between education and ability, we would find that those Baccalaureate grads gaining access to nursing education are the academically talented ones. But since they make up such a small group relative to

Table 6-7(a)

PROBABILITY OF EMPLOYMENT IN NURSING EDUCATION
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(EDUC)	.0379		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	- .6622	1.1268	
.1136	BSN	1.1303	.3834	**
.0857	DIP-BS	1.2260	.3714	**
.0501	MS	2.5846	.3559	**
.0512	OTHED	1.3639	.3768	**
.1069	BSINPR	.4646	.3611	
.0267	MSINPR	1.0013	.3548	**
13.67	EXPER	.0177	.0122	
3.82	OUTLF	- .0061	.0202	
.0223	MALE	.2996	.6913	
.0178	HLTH	.1390	.7004	
.2661	ABIL	- .1023	.2337	
.0379	PHILL	- .0198	.6213	
.0512	ENGCAN	.1558	.5615	
.0256	OTHFOR	.5077	.6177	
.2973	PART	.6482	.2298	**
	CONSTANT	-3.3608	.4295	**

n = 898

log of the likelihood function = -88.83

(-2) X log likelihood ratio = 111.65 ** with 16 df

Table 6-7(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN NURSING EDUCATION From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-3.361	ref	0
	ADN	-4.023		0
	BSN	-2.135	**	.016
	DIP-BS	-2.231	**	.013
	MS	- .776	**	.218
	OTHED	-1.997	**	.023
DEGREE IN PROCESS	NONE	-3.361	ref	0
	BSINPR	-2.896		.002
	MSINPR	-2.360	**	.009
YEARS OF EXPERIENCE	0	-3.361		0
	5	-3.272		0
	10	-3.184		.001
	20	-3.007		.001
	30	-2.830		.002
YEARS OUT OF LABOR FORCE	0	-3.361	ref	0
	5	-3.391		0
	10	-3.422		0
	20	-3.483		0

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

all those in our top ability class, the relationship is not detected here.

The significance of the PART coefficient probably reflects a true demand for part-time workers in nursing education, but due to the problems with reported hours for this group (see the discussion, p. 62) less confidence should be lodged here than otherwise would be warranted.

Tables 6-8(a) and 6-8(b) present the estimates for the model when applied to the probability of being a school nurse. Once again there is no significant difference between ADN and DIP, but all other educational categories are significantly more likely to find employment here. The probability of being a school nurse is highest for MS grads but BSN comes in a close second. The surprising thing is that the DIP-BS group shows such a low probability in Table 6-8(b). Given the overall structure of the equation, it is most likely that this results from a colinearity of DIP-BS with high experience and/or out of the labor force values. It does not appear to be a simple distaste for the school nurse sector on the evidence of Table 6-1, where the raw proportion is similar to that for BSN.

This explanation would seem to be buttressed by the significant positive coefficient on BSINPR. Those who do secure positions as school nurses without a degree find it wise (or necessary) to attempt to complete a BS. But given the BS, it does not seem to be as important to pursue the MS, at least on the evidence of Table 6-8(a), where MS is positive but not significant. However, this is one case where Table 6-8(b) brings such speculations back into line

Table 6-8(a)

PROBABILITY OF EMPLOYMENT IN SCHOOL NURSING
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(SCHL)	.0345		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	.9569	.5207	
.1136	BSN	1.8703	.3540	**
.0857	DIP-BS	1.0621	.3611	**
.0501	MS	1.9797	.3592	**
.0512	OTHED	1.3966	.3778	**
.1069	BSINPR	.6514	.3250	*
.0267	MSINPR	.5023	.3695	
13.67	EXPER	.0368	.0125	**
3.82	OUTLF	.0608	.0164	**
.0223	MALE	-1.9434	1.9716	
.0178	HLTH	.3446	.6182	
.2661	ABIL	- .0614	.2252	
.0379	PHILL	-1.7205	1.5879	
.0512	ENGCAN	-1.1467	1.5258	
.0256	OTHFOR	-1.4354	2.1036	
.2973	PART	- .4958	.2680	
	CONSTANT	-3.6328	.4296	**

n = 898

log of the likelihood function = -91.94

(-2) X log likelihood ratio = 85.74 ** with 16 df

Table 6-8(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY OF EMPLOYMENT IN SCHOOL NURSING
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-3.633	ref	0
	ADN	-2.676		.004
	BSN	-1.763	**	.039
	DIP-BS	-2.571	**	.005
	MS	-1.653	**	.050
	OTHED	-2.236	**	.012
DEGREE IN PROCESS	NONE	-3.633	ref	0
	BSINPR	-2.981	*	.001
	MSINPR	-3.131		.001
YEARS OF EXPERIENCE	0	-3.633	ref	0
	5	-3.449	**	0
	10	-3.265	**	.001
	20	-2.897	**	.002
	30	-2.529	**	.006
YEARS OUT OF LABOR FORCE	0	-3.633	ref	0
	5	-3.329	**	0
	10	-3.025	**	.001
	20	-2.417	**	.008

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

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by calling attention to the tiny probability effect of both these strategies.

Both experience and years out of the labor force are positive and significant in their effect on the probability of working as a school nurse. This is the opposite pattern to the one presented earlier for hospitals. We can conclude that school nurses are older than the average RN. Again none of the personal characteristics are significantly associated with the probability of being a school nurse.

The model for the probability of employment as a public health nurse is presented in Tables 6-9(a) and 6-9(b). Once again, there is no significant difference between DIP and ADN probabilities. But those with degrees, except MS, are significantly more likely to be a public health nurse. There probably is no explicit payoff to a Master's Degree in public health nursing and since this degree requires additional investment for everyone, including those already qualified as public health nurses, we would not expect to find them here. The lack of significance of MSINPR backs this up; it is negative but not significant.

Neither of the labor force variables are significant. Speculation on the reversal of the signs for EXPER and OUTLF is that this is a job area where there is a good deal of mobility in and out of the labor force. If these two coefficients were significant the conclusion would be that the "second-career" people are relatively more important in public health nursing than the average RN. None of the other coefficients are significant; the attainment of a Bachelor's Degree (presumably because this accompanies training in public health nursing) is the only discriminating factor.

Table 6-9(a)

PROBABILITY OF EMPLOYMENT IN PUBLIC HEALTH
Probit Regression

DEPENDENT VARIABLE		$\bar{X}$		
P(PHN)		.0401		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	-1.2487	1.1197	
.1136	BSN	1.1324	.2570	**
.0857	DIP-BS	1.4129	.2510	**
.0501	MS	.6338	.3763	
.0512	OTHED	1.0685	.3309	**
.1069	BSINPR	- .1711	.3589	
.0267	MSINPR	- .4237	.4133	
13.67	EXPER	- .0105	.0108	
3.82	OUTLF	.0115	.0144	
.0223	MALE	-1.9125	2.1134	
.0178	HLTH	-1.5577	2.5181	
.2661	ABIL	.1371	.1974	
.0379	PHILL	- .1758	.4653	
.0512	ENGCAN	- .2270	.5112	
.0256	OTHFOR	-1.6305	2.1352	
.2973	PART	- .3745	.2209	
	CONSTANT	-2.1270	.2722	**

n = 898

log of the likelihood function = -117.37

(-2) X log likelihood ratio = 67.40 ** with 16 df

Table 6-9(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY OF EMPLOYMENT IN PUBLIC HEALTH
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-2.127	ref	.017
	ADN	-3.376		0
	BSN	- .995	**	.159
	DIP-BS	- .714	**	.239
	MS	-1.493		.068
	OTHED	-1.059	**	.145
YEARS OF EXPERIENCE	0	-2.127	ref	.017
	5	-2.180		.015
	10	-2.232		.013
	20	-2.337		.010
	30	-2.442		.007
YEARS OUT OF LABOR FORCE	0	-2.127	ref	.017
	5	-2.070		.019
	10	-2.012		.022
	20	-1.897		.029

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

The final sector to be presented is the remainder category, other nursing sectors. These results are shown in Tables 6-10(a) and 6-10(b). This equation does not perform very well overall, as indicated by the lack of significance of the equation as a whole. This is not surprising in light of the diversity normally expected in such a remainder category. But it is presented for the interest of the two coefficients that are significantly different from zero here. First is the other education category. While a precise interpretation of the process is impossible, it would seem that unusual jobs would tend to call for more unusual educational backgrounds among the RNs filling those jobs.

The more interesting result is the significance of the male variable. This is the one and only time in these sector probability equations that males show a significant difference from females. This is rather annoying in that there is thus evidence here that males are treated differently somehow, but we cannot tell exactly how since the specific details are hidden in the anonymity of the "other" categorization. We can recall the result of Table 5-1 where the mean wage for the OTHER sector was <u>not</u> shown to be significantly different from the hospital mean. But in view of the conventional wisdom that males receive <u>favored</u> treatment in this, a predominantly female profession, the evidence is not very satisfying.

By way of summarizing these results for the probability of employment in the various nursing sectors, let us return to the original hypotheses. Are the sectoral distributions of DIP and BSN grads the same? No, they clearly are not. The results in this

Table 6-10(a)

PROBABILITY OF EMPLOYMENT IN OTHER NURSING SECTORS
Probit Regression

DEPENDENT VARIABLE		$\bar{X}$		
P(OTH)		.0434		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.5814	DIP	reference		
.1180	ADN	.0697	.2910	
.1136	BSN	.4158	.2457	
.0857	DIP-BS	- .4929	.4627	
.0501	MS	.4801	.2955	
.0512	OTHED	.7158	.2647	**
.1069	BSINPR	- .0642	.2648	
.0267	MSINPR	.0851	.5368	
13.67	EXPER	.0063	.0093	
3.82	OUTLF	- .0097	.0150	
.0223	MALE	.8124	.3640	*
.0178	HLTH	.1259	.5431	
.2661	ABIL	- .0792	.1833	
.0379	PHILL	-2.0019	1.7348	
.0512	ENGCAN	- .1440	.3823	
.0256	OTHFOR	- .0606	.5196	
.2973	PART	.0031	.1748	
	CONSTANT	-1.8861	.2234	**

n = 898

log of the likelihood function = -149.64

(-2) X log likelihood ratio = 21.66 with 16 df

Table 6-10(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS ON THE PROBABILITY OF EMPLOYMENT IN OTHER NURSING SECTORS
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-1.886	ref	.029
	ADN	-1.816		.034
	BSN	-1.470		.071
	DIP-BS	-2.379		.009
	MS	-1.406		.079
	OTHED	-1.170	**	.121
YEARS OF EXPERIENCE	0	-1.886	ref	.029
	5	-1.855		.031
	10	-1.823		.034
	20	-1.760		.039
	30	-1.697		.045
YEARS OUT OF LABOR FORCE	0	-1.886	ref	.029
	5	-1.935		.026
	10	-1.983		.024
	20	-2.080		.019
SEX	Female	-1.886	ref	.029
	Male	-1.074	*	.142

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

chapter show that BSN grads are significantly less likely to be employed in the hospital sector and significantly more likely to be employed in nursing education, school nursing and public health nursing than are Diploma RNs. It is therefore clear that DIP grads are not perfect substitutes for BSN grads. Given the assumption that there is basis in fact for the distinctions made by employers between these two, they are not the same factor of production.

Have we been able to establish any differences between DIP and ADN grads in their distribution among the sectors? No, we have not. When controlling for other relevant factors, notably RN work experience, there are no statistically significant differences between ADN graduate RNs and DIP graduate RNs in the probability they will work in any of the nursing sectors identified here. Thus there is no evidence to refute the hypothesis that they are perfect substitutes.

But recall that the distribution of ADN and DIP grads among the nursing sectors did appear to differ in the simple cross-tabulation results (Table 6-1). Thus the failure to reject the null hypothesis that their distribution among the sectors is the same is, in a sense, a product of our probability model. Further, we know that the chief modification introduced by the model is the systematic accounting for the influence of RN work experience on the sectoral distribution. But we also know that the distribution of work experience is quite different for these two educational groups. Recall from Table 4-7 the average years of experience for DIP grads is more than three times that for ADN grads. Has the working out of these influences within the probability model somehow distorted the results? How legitimate is it to suppose that

ADN grads will in fact replicate the DIP pattern as they gain experience? That is the maintained hypothesis here, and since it goes to the very crux of the matter of comparing ADN and DIP grads in their applications, it bears further examination. Earlier in this chapter, we discussed the difficulties of investigating the influence of experience separately for each educational group. But there is another approach to this problem, and it will be presented in Chapter VII.

Another difficulty is more basic as it goes to the question of whether the distribution of RNs among nursing sectors is an adequate test of the null hypothesis that ADN RNs are perfect substitutes for DIP RNs. One could argue that the results presented here have only proved that people with Bachelor's Degrees (or more) are able to operate in job markets from which ADN and DIP grads are excluded. Futhermore, the exclusion of ADN and DIP RNs from these markets restricts their alternatives to hospitals and a number of other relatively small sectors in such a way as to bias the experiment. Thus, given the size of the sample and the number of ADN grads contained in it, one could argue that the general variability of individuals' tastes is such as to insure that the null hypothesis of identical distribution for ADN and DIP grads cannot be rejected.

To respond to this challenge, a more detailed look at the job market results for RNs will be made in the next chapter. We will look at the conditional probability of holding a given position within the hospital sector. Thus, for example, we will test whether the probability of being promoted to head nurse is the same

for ADN and DIP grads, again controlling for other factors that might be relevant. This will serve as a check on the substitutability of ADN and DIP grads but will also be of considerable interest itself.

Chapter VII

SOME EXTENSIONS AND ELABORATIONS

SECTORAL RESULTS WITH A TRUNCATED EXPERIENCE DISTRIBUTION

The first task in this chapter is to present the probit regression estimates of the sectoral probability models for a sample of RNs with a truncated experience distribution. Since we cannot rectify the experimental flaw that ADN grads have not yet accumulated sufficient experience in the work force to fully trace out the lifetime pattern, and the sample is not large enough to allow interaction of experience and education, we must do the next best thing and repeat the RNED comparisons on that portion of the experience range where greater comparability is present. If the similarity of sectoral distribution for ADN and DIP grads found in Chapter VI is a result of the model incorrectly ascribing the observed differences in Table 6-1 to the differences in experience, the fact should become apparent in these estimates.

Suppose no ADN grads are observed employed in a given sector, and that all the RNs who are employed in the sector have at least twenty years work experience. There is no way of telling whether once ADN grads also obtain twenty years of experience they will find employment there. The model will tend to assign the result of no ADN grads employed in the sector to the cause of less than

twenty years experience. While this is an extreme case, it illustrates the type of distortion that could be introduced by the maintained hypothesis that the effect of work experience is the same for all educational groups when the distribution of experience is so radically different.

But if we confine our analysis to a limited range of experience, such that ADN grads are fully represented (that is, they cover the experience range in moderate density), the problem of the experience distributions is reduced. There will still be the possible distortion of assuming experience acts the same in each case, but there will no longer be any experience profile imposed where none exists. This analysis will provide additional tests on the sectoral distribution of RNs by educational preparation, but for a subsample, we will use only those with ten years work experience or less. These tests will be more "direct" in the sense that the assumption in the model that the future experience of ADN grads will be similar to the past experience of DIP grads will not influence the results.

In addition, since ADN grads will be better represented (i.e., a higher proportion of the sample), their experience profile will be relatively more important in determining the "average" effect of experience, assumed common to all educational groups. So, insofar as the common effect of experience in these truncated experience regressions more adequately represents the ADN pattern, we might look for changes in ADN coefficients from the results in Chapter VI. If the assumption of similar effects of work experience for all educational groups were a serious error, we should

notice changes in these ADN coefficients as the magnitude of the error changed.

Table 7-1 gives the maximum likelihood estimate of the probability of employment in the HOSPITAL sector for all RNs in the sample with ten years RN work experience or less. Notice that ADN grads are more than twice as numerous, relatively, as in the regressions in Chapter VI. (Here, ADNs are 24% of the sample versus 12% before, comparing means of independent variables for regression results of Chapter VI with those in Table 7-1). BSN grads constitute 18% of the current sample as opposed to 11% and DIP grads are now cut back from 58% to 43%. These changes reflect the educational trends of the last two decades. On the other hand, the lesser importance of the other educational groups in this sample (DIP-BS, MS, and OTHED) reflect the career educational patterns of RNs in that these groups all require a second period of investment. Actually the surprising thing is that these proportions decline so little.

Other changes in group means are small except for the work experience variables and a slight increase in the proportion of part-time workers. The mean years of working experience drops from nearly 14 to 5.5 for this sample, but the surprising thing is that mean years out of the labor force drops only from 3.8 to 3.1. This suggests that the bulk of those who leave the labor force do so, well before the accumulation of ten years working experience. The proportion of the sample working in hospitals also increases, from 63% to 70%. This is in line with the negative relationship between work experience and the probability of working in a hospital discussed in the last chapter.

Table 7-1

PROBABILITY OF EMPLOYMENT IN HOSPITAL
FOR RNs WITH TEN YEARS EXPERIENCE OR LESS
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(HOSP)	.7019		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.4278	DIP	reference		
.2404	ADN	.0957,	.2044	
.1803	BSN	- .6532	.1905	**
.0721	DIP-BS	- .2691	.2712	
.0481	MS	-1.4797	.3339	**
.0313	OTHED	.0925	.3979	
5.47	EXPER	.0067	.0256	
3.14	OUTLF	- .0348	.0116	**
.0216	MALE	- .2409	.4918	
.0192	HLTH	- .9216	.4946	
.2236	ABIL	- .0659	.1676	
.0409	PHILL	.3798	.3816	
.0505	ENGCAN	.8229	.4218	
.0216	OTHFOR	.1250	.5150	
.3654	PART	- .1192	.1467	
	CONSTANT	.8574	.2095	**

n = 416

log of the likelihood function = -223.76

(-2) X log likelihood ratio = 59.35 ** with 14 df

The major noteworthy result in Table 7-1 is that there still is no significant difference between ADN grads and DIP grads in the probability they will be employed in the HOSPITAL sector. While the sign is positive here and was negative in Table 6-2, in neither case can we reject the hypothesis that it is zero. Nor can we reject the specific hypothesis that these two coefficients are the same (the t statistic for this test is -.342 which does not begin to approach statistical significance). BSN and MS still show significantly lower probability of working in hospitals but DIP-BS and OTHED coefficients are not significant. Apparently the development of the career pattern is different for these groups. Another explanation for OTHED may be that the Diploma with Associate Degree people loom larger in this restricted sample.

EXPER is no longer significant, indicating either that the results of Table 6-2 depended more on the top end of the experience distribution or that the flow out of the hospital sector may be more complicated than stated earlier. It is possible that the flows in and out of the labor force are somehow confusing the issue. This is particularly likely given that the estimate of the effect of years out of the labor force is remarkably close to the earlier result.

The estimated coefficient for HLTH is almost exactly as before, but the standard error has risen so it is not quite significant now. PHILL is no longer significant; this is probably linked with the results on work experience. If the normal pattern was for a steady flow out of the hospital sector with the accumulation of experience, as presented in Table 6-2, but Filipino RNs could not

or would not leave, we would get a significant positive relationship for PHILL in that sectoral regression. But here where the influence of working experience is unimportant, this effect would not show up.

Table 7-2 presents the estimated equation for the probability of working in a NURSING HOME. This corresponds to Table 6-4(a) for the whole sample. These results are remarkably similar; only years out of the labor force is significant and the estimates of this coefficient and nearly all others are very close to the earlier results. Once again there are no significant differences between educational groups in the probability they will be working in a nursing home.

The model for the probability of employment in a CLINIC is presented in Table 7-3. Again the results are as for the full sample: none of the explanatory variables are significant and there is no difference between DIP and ADN. Table 7-4 represents the OFFICE NURSING sector. The performance of the model is not as good as earlier (Table 6-6(a)), and as for the HOSPITAL sector, experience has lost its statistical significance. There are no significant differences between educational groups, nor is the slight change in the ADN coefficient significant.

Table 7-5 gives the estimated coefficients for the model of the probability of working as a PUBLIC HEALTH NURSE. This is the last sector to be presented as it is the only one left with at least twenty observations on the dependent variable. The other sector models were estimated but because of the small numbers of "successful" observations, the results are not meaningful. The

Table 7-2

PROBABILITY OF EMPLOYMENT IN NURSING HOME
FOR RNs WITH TEN YEARS EXPERIENCE OR LESS
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(NSHM)	.0529		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.4278	DIP	reference		
.2404	ADN	- .1684	.3584	
.1803	BSN	- .6596	.4373	
.0721	DIP-BS	- .0339	.4294	
.0481	MS	.3648	.4477	
.0313	OTHED	-2.0554	2.5212	
5.47	EXPER	- .0596	.0441	
3.14	OUTLF	.0526	.0157	**
.0216	MALE	-1.3745	3.1451	
.0192	HLTH	.7616	.5906	
.2236	ABIL	.0338	.2683	
.0409	PHILL	.7407	.4749	
.0505	ENGCAN	-1.9068	2.0125	
.0216	OTHFOR	.6105	.0608	
.3654	PART	.2701	.2520	
	CONSTANT	-1.6426	.3634	**

n = 416

log of the likelihood function = -68.86

(-2) X log likelihood ratio = 34.44 ** with 14 df

Table 7-3

PROBABILITY OF EMPLOYMENT IN CLINIC
FOR RNs WITH TEN YEARS EXPERIENCE OR LESS
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(CLIN)	.0481		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.4278	DIP	reference		
.2402	ADN	.0033	.2874	
.1803	BSN	- .6157	.4328	
.0721	DIP-BS	-1.8380	1.9189	
.0481	MS	.5674	.3864	
.0313	OTHED	.1658	.5288	
5.47	EXPER	- .0169	.0397	
3.14	OUTLF	.0079	.0171	
.0216	MALE	.2643	.5976	
.0192	HLTH	-1.7527	3.3930	
.2236	ABIL	.1561	.2579	
.0409	PHILL	-1.7619	2.4026	
.0505	ENGCAN	- .1796	.5428	
.0216	OTHFOR	-1.7779	3.4727	
.3654	PART	- .2041	.2443	
	CONSTANT	-1.4757	.3081	**

n = 416

log of the likelihood function = -73.29

(-2) X log likelihood ratio = 13.84 with 14 df

Table 7-4

PROBABILITY OF EMPLOYMENT IN OFFICE NURSING
FOR RNs WITH TEN YEARS EXPERIENCE OR LESS
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(OFFC)	.0529		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.4278	DIP	reference		
.2402	ADN	- .0661	.3039	
.1803	BSN	.1824	.2798	
.0721	DIP-BS	- .1818	.4783	
.0481	MS	- .0733	.5115	
.0313	OTHED	-1.8322	2.8094	
5.47	EXPER	- .0097	.0407	
3.14	OUTLF	.0020	.0175	
.0216	MALE	-1.6713	3.3722	
.0192	HLTH	.6671	.6170	
.2236	ABIL	- .1376	.2825	
.0409	PHILL	-1.8671	2.4645	
.0505	ENGCAN	- .0019	.5148	
.0216	OTHFOR	-1.9890	3.3480	
.3654	PART	.2343	.2187	
	CONSTANT	-1.6153	.3157	**

n = 416

log of the likelihood function = -81.68

(-2) X log likelihood ratio = 8.80 with 14 df

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association of most independent variables with the dependent variable is simply not observed; the result is a large coefficient and a large standard error. In addition, colinearity becomes a problem in some instances due to the probability that two or more explanatory variables may be present in only one or two individuals working in the sector. At any rate the results of Table 7-5 further endorse the pattern of this chapter; the model is very similar to that in Chapter VI (Table 6-9(a)). The attainment of the Baccalaureate Degree is the only reliable predictor of employment as a public health nurse.

It is reassuring to find the results of Chapter VI fully endorsed here. There is no change at all in the conclusions about the distribution of DIP, ADN, and BSN grads. We still have not shown any significant difference between DIP and ADN and the earlier distinctions between DIP and BSN held up here. While there is still some uncertainty as to the precise way in which work experience operates in the allocation of RNs among nursing sectors, the truncation of the experience distribution does not appear to have effected the comparisons among educational groups. The implication is that the results of Chapter VI are not significantly distorted by the differences in the distribution of work experience. This holds for all sectors where both results are available.

The conclusion is that the probit probability model of Chapter VI has successfully handled the differences in experience without introducing significant distortion in the measurement of educational differences. Thus the conclusions of Chapter VI as to the effect of RN education on the sectoral distribution of RNs stand confirmed,

Table 7-5

PROBABILITY OF EMPLOYMENT IN PUBLIC HEALTH
FOR RNs WITH TEN YEARS EXPERIENCE OR LESS
Probit Regression

	DEPENDENT VARIABLE	$\bar{X}$		
	P(PHN)	.0505		
$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.4278	DIP	reference		
.2402	ADN	-1.3277	1.0691	
.1803	BSN	1.1687	.3181	**
.0721	DIP-BS	1.2520	.3807	**
.0481	MS	-1.3986	2.3237	
.0313	OTHED	.5349	.6133	
.1250	BSINPR	- .0009	.4896	
.0168	MSINPR	-2.5079	3.8650	
5.47	EXPER	.0356	.0475	
3.14	OUTLF	.0100	.0203	
.0216	MALE	-1.3216	3.1770	
.0192	HLTH	-1.6294	3.2003	
.2236	ABIL	.3542	.2900	
.0409	PHILL	- .0530	.5631	
.0505	ENGCAN	-1.9273	1.9659	
.0216	OTHFOR	-1.4319	3.4033	
.3654	PART	- .3092	.2751	
	CONSTANT	-2.2988	.4247	**

n = 416

log of the likelihood function = -60.55

(-2) X log likelihood ratio = 45.24 ** with 16 df

and our concern about the experimental flaw of restricted experience for ADN grads is also allayed. Let us go on then to the question of the effect of RN education of job assignment within the HOSPITAL sector.

ANALYSIS OF POSITION DISTRIBUTION FOR THE HOSPITAL SECTOR

Table 7-6 presents the simple cross-tabulation of POSITION by RN education for all RNs working in hospitals. Just as with Table 6-1, both column proportions and row proportions are given beneath the cell count in each instance. Directing our attention to the row representing STAFF NURSE, we note that 58% of DIP grads and 78% of ADN grads who work in hospitals hold the position STAFF NURSE. We also see that DIP nurses make up about 61% of all staff nurses while ADN grads make up only 19%.

With the exception of the position DIRECTOR and the MS education group, there is good representation throughout the table; RNs of all educational backgrounds seem to find their way into all the positions. But the same concerns exist as before. Since we know that ADN grads have not had the same work experience, how can we be sure these apparent differences do not represent merely an artifact of the bivariate approach? What accounts for the fact that only 14.5% of ADN grads working in hospitals are head nurses while 21.1% of DIP grads hold this title? The proportion of DIP grads who are supervisors is double the ADN proportion. Is this a manifestation of discrimination against ADNs or does it merely reflect their lack of experience and lesser seniority with the firm? Again we need to call on multivariate methods of analysis for the answer.

We will employ the same basic probit model as before but with the EXPER variable divided here into years of seniority with the current employer (SEN) and other work experience in nursing (OUTEXP).

Table 7-6

POSITION BY RN EDUCATION [1]
EMPLOYMENT SECTOR IS HOSPITAL

POSITION	DIP	ADN	BSN	DIP-BS	MS	OTHER	TOTAL
DIRECTOR OR ASS'T.	12	0	0	2	1	0	15
	.033	0	0	.050	.125	0	
	.800	0	0	.133	.067	0	.026
SUPERVISOR OR ASS'T.	38	4	6	5	1	3	57
	.104	.048	.102	.125	.125	.111	
	.667	.070	.105	.088	.018	.053	.098
HEAD NURSE OR ASS'T.	77	12	10	5	1	7	112
	.211	.145	.169	.125	.125	.259	
	.688	.107	.089	.045	.009	.063	.192

Table 7-6 (continued)

POSITION	DIP	ADN	BSN	DIP-BS	MS	OTHER	TOTAL
STAFF NURSE	212	65	36	23	2	12	350
	.581	.783	.610	.575	.250	.444	
	.606	.186	.103	.066	.006	.034	.601
OTHER	26	2	7	5	3	5	48
	.071	.024	.119	.125	.375	.185	
	.542	.042	.146	.104	.062	.104	.082
TOTAL	365	83	59	40	8	27	582
	.627	.143	.101	.069	.014	.046	

[1]The actual cell count is followed by the proportion that cell is to the column total and then by the proportion that cell is to the row total.

This will make it possible to compare the effects of general nursing experience with the effects of seniority with current employer. One would expect that the latter would be more valuable to the current employer. The other change in the model is the quadratic specification of the experience terms. This allows for the fact that an employee's services become more valuable year by year with increasing experience but at a decreasing rate, possibly eventually ceasing to increase. This is the specification that was planned for the earlier probit regressions on the sectoral probabilities but surprisingly proved inferior to a line r form. But since the steps from staff nurse to head nurse and head nurse to supervisor are clear promotions in the hospital, the normal quadratic specification of human capital derivation returns to dominance here.

There are some changes in the means of the independent variables from earlier results since the scope is narrowed to only those working in hospitals. The importance of ADN and DIP grads is increased while that of MS grads is cut enormously. The BSN, DIP-BS and OTHER groups show modest declines. Summing the means for SEN and OUTEXP yields a mean years of experience of about 12.5 years while for the whole sample mean EXPER was 13.8 years. As could be anticipated from the earlier significance of poor health in excluding people from the hospital sector, there are only five such individuals represented here. This removes the HLTH variable from any significant explanatory role, but it has been retained for reasons of comparability. Aside from these changes, the sample is much the same in the representation of the independent variables.

Table 7-7(a) presents the maximum likelihood estimate of the model for the conditional probability that position is STAFF NURSE

given that sector is hospital. The mean of this variable is shown to be close to .60, so the relative importance of the STAFF position in this set of regressions is similar to that of the hospital sector within all nursing sectors. The results for RN education are not as clear cut as earlier. The only significant coefficient is BSN: BSN grads are significantly less likely than DIP grads to be staff nurses given that they work in a hospital. MS is very nearly significant at the 5% level and it is negative also. The high standard error for MS is a product of the small number of observations in that category. Actually, given that there are only eight MS grads in this sample, this is a surprisingly strong showing. The lack of significance of the DIP-BS coefficient cannot be explained by a large standard error but probably reflects the pattern of career mobility. If an RN was motivated to return to school for her Bachelor's Degree, she apparently had in mind leaving the hospital sector entirely. Thus the DIP-BS RNs that are left represent special selections in some way or other. Finally, there is no significant difference between the probability of being a staff nurse for ADN grads and DIP grads when we control for other relevant factors. Again the bivariate results were misleading.

The results for experience variables are basically as expected. Since movement from the STAFF position constitutes a promotion, the signs of the coefficients are reversed from normal usage. That is, with each year of seniority, you are less likely to be a staff nurse because you have had another year in which you could have been promoted to head nurse or some other position. The significance of the second order term indicates that the probability of being a

staff nurse is decreasing at a decreasing rate. This is shown in Table 7-7(b) where the probit regression results are translated into probability terms. The probability of being a staff nurse drops from .84 at hiring to .64 after five years with the employer, then to .46 after ten years. But with the next ten years of seniority, it only drops to .37. The probability at hiring is not unity because there is hiring at other than the staff nurse position.

Experience with other employers (OUTEXP) shows a similar pattern, but the fluctuations are less drastic. The coefficients for experience outside the current employer indicate that a year of this general experience has about one-half the value of a year of seniority in producing promotion out of the staff nurse category. Table 7-7(b) shows that the probability of being a staff nurse declines about half as fast with outside experience as it does with seniority. This suggests that hospitals <u>are</u> willing to credit the individual with other experience and do not insist on a strict promotion-from-within standard.

The signs of the coefficients for the out of the labor force variable (OUTLF) in Table 7-7(a) are the reverse of those for the experience variables. This reflects the obsolescence question considered earlier. First, we know from results in Chapter VI that a RN that has left the labor force is less likely to return to the hospital than other sectors if she does return to work. Here we see that if she does return to the hospital, the probability that she will be a staff nurse appears to increase slightly for the

Table 7-7(a)

CONDITIONAL PROBABILITY POSITION IS STAFF
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
Probit Regression

DEPENDENT VARIABLE	$\bar{X}$
P(STAF|HOSP)	.5975

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.6279	DIP	reference		
.1485	ADN	.1149	.2080	
.0966	BSN	- .4367	.2131	*
.0698	DIP-BS	- .1292	.2349	
.0143	MS	- .9425	.5086	
.0429	OTHED	- .3971	.2992	
5.38	SEN	- .1518	.0317	**
59.13	SENSQ	.0042	.0016	**
7.16	OUTEXP	- .0940	.0267	**
98.28	OUTEXPSQ	.0028	.0010	**
3.11	OUTLF	.0437	.0362	
36.79	OUTLFSQ	- .0028	.0021	
.0233	MALE	.1494	.3883	
.0089	HLTH	2.2132	1.4591	
.2612	ABIL	.0268	.1383	
.0519	PHILL	.6730	.2802	*
.0590	ENGCAN	- .2927	.2472	
.0322	OTHFOR	- .0528	.3202	
.2791	PART	1.0036	.1464	**
	CONSTANT	-1.0021	.1866	**

n = 559

log of the likelihood function = -298.53

(-2) X log likelihood ratio = 156.48 ** with 18 df

Table 7-7(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY POSITION IS STAFF NURSE
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	1.002	ref	.841
	ADN	1.117		.869
	BSN	.565	*	.712
	DIP-BS	.873		.808
	MS	.060		.524
	OTHED	.605		.726
SENIORITY	0	1.002	ref	.841
	5	.348	**	.637
	10	- .096	**	.460
	20	- .354	**	.367
OTHER EXPERIENCE	0	1.002	ref	.841
	5	.602	**	.726
	10	.342	**	.633
	20	.242	**	.595
YEARS OUT OF LABOR FORCE	0	1.002	ref	.841
	5	1.151		.875
	10	1.159		.877
	20	.756		.776
TRAINING SITE	U.S.	1.002	ref	.841
	Phillipines	1.675	*	.954
	England/Canada	.709		.761
	Other foreign	.949		.829
WORK STATUS	Full-time	1.002	ref	.841
	Part-time	2.006	**	.978

[1]The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

first eight years and then declines.[71] However, these coefficients are not significantly different from zero in any of the conditional probability equations and their erratic behavior does not increase confidence in them.

Table 7-7(a) also shows that RNs trained in the Phillipines are significantly more likely to be employed as staff nurses within the hospital. Since there is little reason to expect Filipinos to exhibit distastes for promotion (unlike the sectoral question where there was a reasonable possibility of differing tastes), the conclusion is either that Filipinos are simply discriminated against or that somehow a language barrier or cultural differences make them less effective in the hospital setting. Notice that RNs trained in other foreign countries (not English-speaking) are not more likely to be staff nurses. While this is not anything like an ideal control for language difficulties, it would tend to support the discrimination conclusion. The last significant coefficient in Table 7-7(a) is for part-time work. Table 7-7(b) shows that it is highly probable that someone working part-time in a hospital will remain a staff nurse. Promotion seems to require a full-time commitment.

Table 7-8(a) is the estimated model for the probability position is HEAD NURSE given that the employment sector is hospital. Head nurse (including assistant head nurse) is usually the first

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[71]This result is obtained by solving for the maximum of the quadratic function of OUTLF.

step up for a staff nurse.[72] The mean of the dependent variable indicates that about 20% of the RNs employed in hospitals are head nurses (or assistants). Thus there are about three staff nurses for every head nurse in California hospitals. The most interesting thing about Table 7-8(a) is the clear picture it gives us of the route to promotion. Educational background does not have a significant impact on the probability of being a head nurse; seniority is clearly the most important factor. The translations given in Table 7-8(b) show that the probability of being a head nurse doubles with the accumulation of five years of seniority, and nearly triples with ten years. The quadratic form fit here actually yields a maximum at about eleven years of seniority, and then it begins to decline. We can assume that those with much more than ten years of work experience for one employer have for some reason been found lacking and therefore were passed over for promotion. Thus the probability of becoming a head nurse declines as seniority continues to rise.

In contrast to the results on seniority, work experience outside the firm (OUTEXP) does not perform very well. Neither term is significant, although the signs are as expected. The probability translates of Table 7-8(b) show that ten years of experience outside the firm increases the probability of being a head nurse less than half as much as five years experience with the firm. It appears that the apparent transferability of experience we found when looking at the probability of leaving the staff nurse position

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[72] Charge nurse has not been treated as a separate position from staff nurse here because it does not usually constitute a permanent promotion and there is normally no wage premium paid.

does not translate into an equivalent flexibility in becoming a head nurse. Thus a good many RNs must have moved from staff nurse to positions other than head nurse. Later we shall see some corroborative evidence for this.

The coefficients for OUTLF are not significant but the signs indicate that the probability of being a head nurse declines with years out of the labor force but at a declining rate. The negative influence of OUTLF indicates that an interruption of continuous work experience does reduce the chance of becoming a head nurse. The general pattern for a head nurse thus appears to be promotion out of the staff nurse ranks. The combination of seniority and demonstrated competence are probably dominant.

The coefficients on the foreign training variables further confuse the issue on the effects of foreign training. Notice that Filipino RNs are not signigicantly less likely than U.S.-trained RNs to be head nurses. But RNs trained in other foreign countries (both English-speaking and non English-speaking) are significantly more likely than U.S.-trained RNs to be head nurses. The best comment seems to be to repeat the earlier warnings. It is very difficult to derive unambiguous results about the joint result of supply and demand forces from a single-equation representation of that result. A result that is not so ambiguous is the last one of Table 7-8(b). RNs who want to work only part-time schedules are less than one-fourth as likely to be head nurses as those not restricting their supply of hours. This probably reflects a general principle of requiring a full commitment from managerial personnel; we shall see it again in the next equation.

Table 7-8(a)

CONDITIONAL PROBABILITY POSITION IS HEAD NURSE
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
Probit Regression

DEPENDENT VARIABLE	$\bar{X}$
P(HEAD|HOSP)	.1950

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.6279	DIP	reference		
.1485	ADN	- .0356	.2251	
.0966	BSN	- .0332	.2489	
.0698	DIP-BS	- .2413	.2803	
.0143	MS	- .2599	.5960	
.0429	OTHED	.2156	.3021	
5.38	SEN	.1308	.0360	**
59.13	SENSQ	- .0058	.0018	**
7.16	OUTEXP	.0351	.0290	
98.28	OUTEXPSQ	- .0010	.0012	
3.11	OUTLF	- .0552	.0395	
36.79	OUTLFSQ	.0027	.0022	
.0233	MALE	.3084	.3779	
.0089	HLTH	-1.9430	1.8460	
.2612	ABIL	- .0484	.1513	
.0519	PHILL	- .0505	.2905	
.0590	ENGCAN	.5009	.2465	*
.0322	OTHFOR	.6240	.3160	*
.2791	PART	- .7073	.1739	**
	CONSTANT	-1.2174	.2058	**

n = 559

log of the likelihood function = -246.57

(-2) X log likelihood ratio = 58.46 ** with 18 df

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Table 7-8(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY POSITION IS HEAD NURSE
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
From Probit Regression

		STANDARD NORMAL ORDINATE	[1]	$\hat{p}$
RN EDUCATION	DIP	-1.217	ref	.111
	ADN	-1.253		.106
	BSN	-1.251		.106
	DIP-BS	-1.459		.072
	MS	-1.477		.069
	OTHED	-1.002		.159
SENIORITY	0	-1.217	ref	.111
	5	- .708	**	.239
	10	- .489	**	.312
	20	- .921	**	.179
OTHER EXPERIENCE	0	-1.217	ref	.111
	5	-1.066		.142
	10	- .966		.166
	20	- .915		.179
YEARS OUT OF LABOR FORCE	0	-1.217	ref	.111
	5	-1.426		.076
	10	-1.499		.067
	20	-1.241		.108
TRAINING SITE	U.S.	-1.217		.111
	Phillipines	-1.267		.104
	England/Canada	- .716	*	.236
	Other foreign	- .593	*	.278
WORK STATUS	Full-time	-1.217	ref	.111
	Part-time	-1.924	**	.027

[1] The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

Tables 7-9(a) and 7-9(b) show the results for the probability of being a SUPERVISOR. The sample mean for this position indicates that there is one supervisor for every two head nurses in the hospital sector. Supervisors generally are not involved in the direct management of the patient care function. While head nurses are responsible for the operation of some hospital unit (i.e., first-line managers), supervisors represent the next tier. They oversee the operations of a number of units and handle problems that come up from below. The low ratio of head nurses to supervisors here reflects the fact that there are supervisors on duty around the clock, although in reduced numbers on evenings and nights, but there is only one head nurse to a unit; accountability in her absence is handled through the "charge nurse" function (which is not a position change but merely an assignment of responsibility).

At any rate, there are some similarities here to the model for head nurse, and some differences as well. The most interesting difference is that BSN grads are significantly more likely to be supervisors than are DIP grads. In addition, while not significantly different, the predicted probability for MS grads is double that for DIP grads and the suspicion is that with a larger sample, other significant educational differences might be apparent. However, there is no indication that the probability of being a supervisor differs for DIP and ADN grads. The difference in the raw sample proportions (shown in Table 7-6) occupying the position of supervisor is thus shown to result from the differences in work experience.

When we turn to work experience, we see much the same pattern

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Table 7-9(a)

CONDITIONAL PROBABILITY POSITION IS SUPERVISOR
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
Probit Regression

DEPENDENT VARIABLE	$\bar{X}$
P(SUP|HOSP)	.1002

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.6279	DIP	reference		
.1485	ADN	.0393	.3313	
.0966	BSN	.6141	.2963	*
.0698	DIP-BS	.1530	.3137	
.0143	MS	.3089	.5945	
.0429	OTHED	.2498	.3991	
5.38	SEN	.1364	.0427	**
59.13	SENSQ	- .0035	.0019	
7.16	OUTEXP	.0326	.0356	
98.28	OUTEXPSQ	- .0001	.0013	
3.11	OUTLF	.0460	.0479	
36.79	OUTLFSQ	- .0018	.0029	
.0233	MALE	- .4484	.6390	
.0089	HLTH	-1.7569	3.4916	
.2612	ABIL	- .0677	.1863	
.0519	PHIL	-2.3865	1.4392	
.0590	ENGCAN	- .0460	.3505	
.0322	OTHFOR	-2.2421	1.7410	
.2791	PART	-1.0399	.2711	**
	CONSTANT	-2.0853	.2894	**

n = 559

log of the likelihood function = -145.96

(-2) X log likelihood ratio = 71.95 ** with 18 df

Table 7-9(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY POSITION IS SUPERVISOR
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-2.085	ref	.019
	ADN	-2.046		.020
	BSN	-1.471		.071
	DIP-BS	-1.932		.027
	MS	-1.776		.038
	OTHED	-1.836		.033
SENIORITY	0	-2.085	ref	.019
	5	-1.491	**	.068
	10	-1.071	**	.142
	20	- .757	**	.224
OTHER EXPERIENCE	0	-2.085	ref	.019
	5	-1.925		.027
	10	-1.769		.038
	20	-1.473		.071
YEARS OUT OF LABOR FORCE	0	-2.085	ref	.019
	5	-1.900		.029
	10	-1.805		.036
	20	-1.885		.030
WORK STATUS	Full-time	-2.085	ref	.019
	Part-time	-3.125	**	.001

[1]The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

as for head nurse: only seniority is significant. In this case the second order term just misses being significantly different from zero, but we can reject the hypothesis that it is positive. The maximum value of this quadratic form occurs at close to twenty years, so it is a long wait "in ranks." Table 7-9(b) shows that the value of experience with other employers has a value similar to that found in the head nurse results, about one-fourth that of seniority (since it takes twice as long to raise the probability of being a supervisor half as high).

The pattern for years out of the labor force is interesting in that it is the reverse of what we found for the HEAD NURSE position. Here the signs suggest that years spent out of the labor force tend to increase the probability of being a supervisor. While the coefficients are not significantly different from zero and thus are not to be taken too seriously, it is a puzzle, especially when the other experience coefficients are so similar to those in the head nurse model. The only logical explanation is that most RNs who accumulate enough seniority to become supervisors have also spent time out of the labor force somewhere along the way. Another similarity to the head nurse results is for part-time workers. They are much less likely to become supervisors or head nurses. The presumption is that this is a hospital decision.

Tables 7-10(a) and 7-10(b) present the final conditional probability model, the probability position is OTHER given employment sector is hospital. The mean of the dependent variable is .08, so this is not a trivial category even if it is rather amorphous. The results are presented here because the overall pattern

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is unlike anything seen earlier. Both BSN and MS grads are significantly more likely than DIP grads to have positions outside the traditional hospital structure of staff nurse, head nurse, and supervisor. There is no difference between ADN and DIP, however, so the earlier conclusions on education are reinforced: DIP and ADN grads are indistinguishable but BSN grads are treated separately.

The unique result here is that seniority is not significant in explaining the OTHER position but outside experience (OUTEXP) is. Thus, rather than promotion from within, we have a pattern of recruitment of experienced workers from outside the firm. Further, the RNs holding the OTHER positions do not appear to be the "second-career" people, since the suggested influence of years out of the labor force is negative. None of the other characteristics is important in explaining the probability of holding a position classified as OTHER. In summary, this appears to be where the hospital utilizes more highly trained RN manpower. They are recruited from outside the firm and probably would tend (if we had information about their actual functions) to make up the "expert" or specialist functions as opposed to the hierarchical hospital titles we looked at earlier.

The results of this section have served to extend the application of the model of RN job distribution into an additional area of interest. Given that the hospital is the dominant arena of nursing practice, perhaps these results are even more interesting than the sectoral distribution results discussed in Chapter VI. But our interest lies in trying to determine the job market out-

Table 7-10(a)

CONDITIONAL PROBABILITY POSITION IS OTHER
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
Probit Regression

DEPENDENT VARIABLE	$\bar{X}$
P(OTHPO|HOSP)	.0805

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.6279	DIP	reference		
.1485	ADN	- .1894	.3574	
.0966	BSN	.5624	.2686	*
.0698	DIP-BS	.4374	.2919	
.0143	MS	1.0963	.4900	*
.0429	OTHED	.3792	.3710	
5.38	SEN	.0422	.0442	
59.13	SENSQ	- .0009	.0021	
7.16	OUTEXP	.1308	.0455	**
98.28	OUTEXPSQ	- .0051	.0021	*
3.11	OUTLF	- .0777	.0499	
36.79	OUTLFSQ	.0044	.0027	
.0233	MALE	-2.0780	2.2898	
.0089	HLTH	-1.9580	3.7568	
.2612	ABIL	.0402	.1849	
.0519	PHILL	- .1643	.3850	
.0590	ENGCAN	- .5056	.4808	
.0322	OTHFOR	- .2260	.4901	
.2791	PART	- .1001	.2005	
	CONSTANT	-2.0768	.2953	**

n = 559

log of the likelihood function = -139.85

(-2) X log likelihood ratio = 33.32 * with 18 df

Table 7-10(b)

ESTIMATED EFFECT OF VARIOUS INDIVIDUAL CHARACTERISTICS
ON THE PROBABILITY POSITION IS SUPERVISOR
GIVEN EMPLOYMENT SECTOR IS HOSPITAL
From Probit Regression

		STANDARD NORMAL ORDINATE [1]		$\hat{p}$
RN EDUCATION	DIP	-2.077	ref	.019
	ADN	-2.266		.012
	BSN	-1.514	*	.066
	DIP-BS	-1.639		.051
	MS	- .981	*	.164
	OTHED	-1.698		.045
SENIORITY	0	-2.077	ref	.019
	5	-1.888		.029
	10	-1.745		.041
	20	-1.593		.056
OTHER EXPERIENCE	0	-2.077	ref	.019
	5	-1.550	**	.061
	10	-1.279	**	.100
	20	-1.501	**	.067
YEARS OUT OF LABOR FORCE	0	-2.077	ref	.019
	5	-2.356		.009
	10	-2.414		.008
	20	-1.871		.031

[1]The levels of significance indicated by the asterisks refer to the t tests on the probit regression coefficients.

comes of RN education, particularly ADN and DIP programs. In this light, the results of the analysis of job title within the hospital serve to further endorse the results of Chapter VI. Registered Nurses with Baccalaureate Degrees or above are clearly different from DIP grads; ADN grads are not. In some seventeen different distributional equations and in the wage structure analysis of Chapter V, no significant difference between ADN and DIP grads has been shown. There is one final test to be performed however. In the next section we present a reduced form wage analysis which serves to combine all the preceding analyses into one regression equation of the hourly wage as a function of the personal characteristics of the RN.

THE HOURLY WAGE BY INDIVIDUAL CHARACTERISTICS

Table 7-11 presents the least-squares estimate of a reduced form wage equation corresponding roughly to the two-equation model that has been employed here. This equation expresses the RN's hourly wage as a function of her location, education, work experience, sex, ability (as measured by high school rank), health, and location of training. It also contains dummy variables to adjust for the wage effects of part-time work, shift work, and the presence of collective bargaining. Otherwise the job related variables of the wage equation employed in Chapter V are omitted. For this analysis, we want the effect of sector, position, and type and size of employer to be captured by the characteristics of individuals holding the jobs rather than by the attributes of the job itself. In a sense we sum up in this one regression all the previous results. Whereas before we looked at the wage as a function of the job (crudely measured, to be sure) and the probability of getting the job as a function of the characteristics of the individual RN, now we associate the wages directly with the individual characteristics.

As in Chapter V, the dependent variable for this regression is the log of the hourly wage, so all coefficients express percentage wage differentials. Also as in previous results, the discrete independent variables measure the effect of the variable compared to some reference value, most often just the absence of

the effect represented by the variable. Where the reference group is not so easily identified, it is indicated in the table.

The first group of variables represents the labor market where the RN is employed. These are the same divisions utilized in Chapter V; in fact, there are no new variables introduced anywhere in this analysis. As in the earlier results, these coefficients are not of particular interest but constitute control of an extraneous factor which could distort more meaningful comparisons. The San Francisco-Oakland SMSA is the reference category. The changes in magnitude of some of the coefficients from those for the same labor markets in Chapter V reflect the differing RN job structures in different labor markets. Earlier we saw the geographical differentials change from Table 4-1, where simple means were presented, to Table 5-1, where the multivariate analysis controlled for the job structure in each labor market. The situation here is intermediate in that the job structure is not controlled except to the extent that the RN education variables serve this purpose. We saw in Chapter VI that for some high wage areas, notably nursing education, public health nursing and school nursing, RN education does correlate well enough with sector to imperfectly represent the job structure. So the labor market differentials of Table 7-11 are not directly comparable to either of the earlier results, but do perform a control function appropriate for the purpose at hand.

We shall skip over the results for RN education until we have discussed all the other variables, but will note here that the results for degree in process (BSINPR and MSINPR) seem to reflect the connection betwe n nursing education and the Master's Degree. The

RNs who are currently working for a Bachelor's Degree do not earn a significantly higher wage than those who are not, but those working for a Master's Degree do. Presumably this is because, as mentioned earlier, in times of shortage people are hired for nursing education with the understanding that they will complete the educational requirement while holding the job. This is probably less true of jobs requiring a Bachelor's Degree. Besides, the basic wage differentials for these jobs are considerably less than for the MS jobs in the first place.

The effects of RN work experience on the hourly wage are divided here into the effect of years of seniority with the current employer (SEN) and years of other experience (OUTEXP). While both sets of coefficients are significantly different from zero, the effect of seniority is three to four times as large as that for other experience. Five years of seniority raises the average wage by 8.9% while an equivalent amount of experience outside the firm only yields 2.5% Ten years of seniority translates into a 15.3% differential, while ten years of other experience is only worth 4.0%. In nursing, education and seniority clearly are the keys to advancement. For those willing to return to school and further their investment in themselves, we have seen that entry to higher paying areas of nursing is possible. For the rest, long and loyal service appears to be the best strategy. We saw this in the analysis of hospital positions and we see its reflection here in wage terms.

In the next group of variables, we see that part-time workers do not earn significantly less than full-time workers. And we see

that the shift differential, as in the wage equation of Chapter V, does not quite achieve statistical significance. We could reject the hypothesis that RNs earning a shift differential earn less than others, but the shift differential (which is, of course, known to exist in some areas) is not large enough to overshadow its standard error. This is not the case with the influence of collective bargaining, however. Table 7-11 shows that collective bargaining produces, when controlling for personal characteristics, a 5% wage gain for RNs. This is larger than the estimates of Chapter V (and less accurate in a theoretical sense) because the effects of sector and position are ignored here.

The most surprising result among the remaining individual characteristics is the effect of sex on the hourly wage. We were not able to establish any significant differences among male and female RNs earlier except for a greater propensity for males to be employed in "other" nursing sectors. Yet the effect of being a male RN is estimated here to increase hourly earnings by 13%. Since the mean wage of the OTHER nursing sector was not significantly different from the hospital wage, the implication is that males must be paid more than females within the job categories used here. They are either standing at the top of job ladders which we are measuring rather imperfectly, or else they are being paid higher wages for doing the same work. In either case, this is clearly an issue which requires further empirical work.

The high school rank variable (ABIL) is not associated with the hourly wage of RNs. This measure of ability is definitely not related to success within nursing except possibly through educa-

Table 7-11

REDUCED FORM WAGE EQUATION
REGRESSION OF LOG OF HOURLY WAGE
ON PERSONAL CHARACTERISTICS

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
.202	SFO	reference category		
.059	ANAH	-.0393	.0266	
.323	LA	-.0118	.0166	
.040	RIV	-.0002	.0311	**
.035	SBOX	-.0374	.0329	
.068	SD	-.1436	.0255	**
.072	SJ	-.0584	.0245	*
.031	SRVN	-.0632	.0345	
.049	SAC	-.0694	.0283	*
.029	STOCMO	-.0562	.0352	
.030	FREHAVI	-.1357	.0349	**
.061	OTHLOC	-.0608	.0264	*
.580	DIP	reference category		
.114	ADN	.0114	.0204	
.116	BSN	.0803	.0193	**
.090	DIP-BS	.1019	.0212	**
.049	MS	.3272	.0270	**
.051	OTHED	.0936	.0260	**
.106	BSINPR	.0271	.0186	
.029	MSINPR	.1114	.0357	**

Table 7-11 (continued)

$\bar{X}$	INDEPENDENT VARIABLES	$\hat{b}$	se	
5.57	SEN	.0203	.0025	**
66.62	SENSQ	-.0005	.0001	**
8.18	OUTEXP	.0060	.0023	**
121.31	OUTEXPSQ	-.0002	.0001	*
.296	PART	-.0135	.0127	
.242	SHIFT	.0261	.0136	
.382	COBARG	.0520	.0125	**
.022	MALE	.1316	.0384	**
.278	ABIL	.0105	.0129	
.017	HLTH	.0016	.0436	
.040	PHILL	.0064	.0294	
.049	ENGCAN	.0074	.0265	
.027	OTHFOR	-.0078	.0354	
	CONSTANT	1.5455	.0225	**

Summary Statistics

n	879
standard error of regression	.1580
R^2	.3940
sum of squared residuals	19.39
mean square residual	.0250
F	16.29

tional channels. There also is no significant difference in the wage of RNs with health problems. Apparently they are able to find ways of compensating for the exclusion from the hospital sector we discussed in Chapter VI. There also are no differences in the earnings of foreign-trained RNs. We have earlier demonstrated that there are marked differences in the job market outcomes for the three foreign training groups, so this result is a good example of the danger in using reduced form wage equations. Without the detailed examination of the influence of foreign training on job distribution, one would have no clue whatsoever on the evidence of this wage regression that there are any distinctions among those trained in foreign countries, or between foreign-trained and U.S.-trained RNs.

Finally, the set of regression coefficients for RN education represents a summary of all our earlier hypotheses about the effects of RN education on RN job market outcomes. The wage differentials with RN education appearing here represent the composite effect of the wage structure of the RN job world and the distribution of RNs of various educational backgrounds throughout that job world. There is no problem of misinterpretation of the observed wage differentials in this equation because we have already made a detailed examination of the components of these differentials in earlier chapters.

The Diploma trained RNs again serve as the reference group and it can easily be seen that all educational groups, save one, earn significantly more than DIP grads. As expected, the MS grads earn the most, roughly one-third more per hour than DIP grads. The BSN,

DIP-BS and OTHED groups all earn 8-10% more per hour than DIP grads. All these differences are highly significant. On the other hand, there is no difference between the hourly earnings of DIP grads and ADN grads. This result further endorses the previous conclusions that there are so significant differences between ADN and DIP grads when the effect of work experience is adequately controlled. Thus there is no reason to doubt that they are perfect substitutes.

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CHAPTER VIII

SUMMARY AND CONCLUSIONS

This effort has been aimed at investigating the connections between RN education and the subsequent experience in the RN job market. The emphasis throughout has been on comparisons among Registered Nurses trained in the three types of basic educational programs: three year hospital Diploma programs (DIP), four year college or university degree programs (BSN), and the relatively new two year community college programs (ADN). In order to get meaningful comparisons among graduates of the basic programs, however, it was necessary to separate those who had completed Degrees subsequent to their basic preparation also. Thus three more educational categories were distinguished: those DIP and ADN grads who later completed a Bachelor's Degree (DIP-BS), RNs of any preparation holding Master's Degrees (MS), and a small, diverse remainder category within which the largest single group was DIP grads who had completed an Associate Degree (OTHED).

The type of educational preparation for nursing has been a matter of considerable controversy, especially since the publication of the American Nurses Association position paper in 1965. This paper urged the extinction of the hospital based Diploma schools of nursing and their replacement by programs based in the colleges and universities. This accompanied a proposal to divide the Registered Nurse function into technical nursing and profession-

al nursing, presumably corresponding to ADN and BSN preparation. However, recent trends show that while debate continues on the technical and professional nurse issue, the ADN programs have virtually supplanted the traditional DIP programs in California, due to the highly developed community college system in California. Thus the effective policy question is, "Can the ADN grads adequately replace the DIP grads?"

The approach used here in answering this question is an indirect one. It is left to the employers of RNs to compare the performance of graduates of different educational programs. Neoclassical theory of the demand for factors of production is used to establish the proposition that if two types of RN are perfect substitutes for each other, they must be paid the same wage in equilibrium.

The structure of the market for RNs is examined and two major imperfections, the dominance of nonprofit firms and the existence of monopsony power, are discovered. With the aid of some simplifying assumptions the nonprofit firm question is investigated empirically. Comparisons between nursing manpower input usage by proprietary and voluntary hospitals of similar size show that nonprofit hospitals do use more highly skilled manpower, but the increased need for supervisory personnel in the for-profit hospitals tends to reduce the net contrasts. When demand for RNs is "reconstituted" under proprietary staffing ratios, only a three percent reduction in demand for RNs is indicated. The general conclusion of the examination of RN market structure is that while this market does not meet the neoclassical sssumptions, it is expected to show meaningful relative wages for the three basic types of educational preparation for Registered Nurses.

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A two equation model is used to compare the job market outcomes for these six RN educational groups. The first equation (the wage equation) expresses the wage as a function of job characteristics. These include the location, the sector of nursing, the job title, the ownership type of the employer, the size of the employer, and the status of the job as regards shift work, part-time work and collective bargaining. In addition, the years of seniority and the RN educational type of the individual holding the job are included. The former controls for longevity wage increases and the latter tests the null hypothesis that there are no educational wage differentials within job categories.

The second equation of the model (the sectoral distribution equation) expresses the probability that an RN of given characteristics will be employed in a particular sector of nursing practice. The personal variables include type of RN education, years of RN work experience, years spent out of the labor force, sex, health status, high school class rank, country of RN training, and a part-time worker variable which represents a restriction of supply by the individual. This equation is used to test the hypothesis that the distribution of RNs among the various nursing sectors is independent of RN education type.

This model is applied to the results of a sample survey of 1934 California resident RNs conducted in the summer of 1973. A simple one-in-sixty random sample of current registrants under the age of sixty-five was drawn and a survey by mail was initiated. Data were gathered in the areas of educational background, labor force behavior, RN job specifications, and personal variables such as age, sex, family status, etc. There were three waves of ques-

tionnaires sent out roughly one month apart and an overall response rate of about eighty percent was achieved. The empirical results are based on the responses of the 942 individuals who were employed as RNs at the time of the survey.

The wage equation is estimated for the entire sample and it is found that only the DIP-BS and MS educational groups show significant wage differentials when controlling for job variables. Thus there are no significant wage differences between DIP graduate, ADN graduate and BSN graduate RNs when controlling for the jobs they hold. Employers of RNs do not find it necessary to make formal wage distinctions among graduates of the three basic types of RN programs.

The wage equation is also estimated for the hospital sector alone and for hospital staff nurses on the grounds that this provides a closer check of wage relationships in the dominant hospital sector. The results are the same; there are no wage distinctions made between RNs from the three basic RN education programs. Any differences in job market results lie in the area of access to job areas, not in formal educational wage differentials.

The sectoral distribution equation is fit to each of the following sectors of nursing practice: hospitals, nursing homes, clinics, office nursing, nursing education, school nursing, public health nursing, and other nursing sectors. In addition, the same equation is applied to the probability of holding a given position within the hospital sector. These distributional results establish definite patterns of employment for different educational groups.

Comparisons of sectoral probabilities between DIP grads and BSN grads show the latter are significantly less likely to be

employed in hospitals and significantly more likely to be employed in nursing education, school nursing and public health nursing. Within the hospital sector BSN grads are significantly less likely to be staff nurses and significantly more likely to be supervisors and to hold positions outside the regular hospital chain of command. Thus DIP grads are not perfect substitutes for BSN grads. While the results for the wage equation show that they are paid the same wage for the same job, the sectoral probability equations show that their distribution is markedly different. It is concluded that they are not the same factor of production.

On the other hand, comparisons between the sectoral probabilities of DIP grads and ADN grads reveal no significant differences whatsoever. The probability of being employed in each of the eight sectors and in the four positions within the hospital sector is the same for DIP and ADN grads when other relevant factors are controlled.

The most important among these other factors is work experience. Because of the relative newness of ADN programs, ADN grads on the average have less than one third as much work experience as DIP graduates. Concern over possible contamination of the educational results by the influence of this factor leads to one further experiment. The sectoral probability equations are reestimated on a sample of RNs with no more than ten years working experience. This serves as a check on the influence of work experience in the earlier equations. Once again, there are no significant differences between DIP and ADN sectoral probabilities. Since ADN and DIP grads are paid the same wage given the job, and have the same probability of getting each of the jobs tested here, the conclusion

is that they are perfect substitutes; they are the same factor of production.

While these results appear to be rather definitive, they do rely entirely on the workings of the labor market for RNs. If employers of RNs perceive significant differences in the performance of graduates of different types of programs, but for some reason do not effectively translate their preferences into their demand for RNs, the differences will not find expression in the labor market and hence will not be detected here.

This is one possible explanation of the contradiction between the results presented here and the miscellaneous comments about the incompetence of ADN graduate RNs. It is more likely however that the complaints are a reflection of temporary inadequacies of ADN graduates in particular skills, especially during the period immediately following graduation and licensure. Since ADN graduates have not had as much on-the-job training as DIP graduates, they would naturally be less competent in specific skills. However they apparently master these things rather quickly.

This study also is definitely set in California. The possible effects of this are unknown, but the labor market relied upon to discriminate among different RNs is the California market, and the educational system which trained most of the ADN graduates is the California system. Whether these results could be replicated in another state is not known.

Subject to these conditions, however, the conclusion of this study is that the ADN RNs <u>are</u> meeting the test of the market. A final evaluation of the preferred method of training Registered Nurses should probably await a <u>direct</u> examination of the perfor-

mance of graduates of various programs and the accumulation of cost data on a more complete and consistent basis than is available now. However, given the presumption that social costs of training RNs resemble the private costs, the indirect measurements of RN performance through the job market results presented here would establish a preference for ADN programs. If the product is the same and the costs of production are lower, the choice is clear.

On the other hand, BSN Registered Nurses are a different factor of production. This study demonstrates marked contrasts between the BSN and DIP RNs, both in distribution among job areas and in wage levels. While it appears that BSN graduates can substitute for DIP graduates, the reverse is not the case. Overall, the position of the nurse educators is supported: BSN graduate RNs do appear to be quite distinct, a separate factor of production, and ADN graduate RNs do appear to be capable of replacing Diploma RNs in the long run.

APPENDIX

This Appendix consists of the three questionnaire cover letters, and the questionnaire in its original form which were sent to the respondents and from which the data for this effort was collected.

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INSTITUTE OF INDUSTRIAL RELATIONS BERKELEY, CALIFORNIA 94720

June 12, 1973

Dear Registered Nurse,

Do the graduates of Associate Degree nursing programs secure different positions and receive different salaries than graduates of Diploma programs? What is the relationship between these groups and Baccalaureate nurses? To what extent is advanced education required for promotion in nursing? These are questions we are seeking the answers to, answers which I think will be of interest both to RNs and to policy makers.

To answer these questions, we at the Institute of Industrial Relations are conducting a mail survey of a sample of Registered Nurses in California. Your name was drawn at random from RNs currently licensed by the California Board of Nursing Education and Nurse Registration. Would you assist us by completing and returning the enclosed questionnaire at your earliest convenience? Our pretests show it takes at most about 15 minutes to complete.

The questions are mostly about your nursing education and your current nursing position, if any. We are seeking a sample representative of all California RNs and thus each response is important regardless of employment status. Even if you have no intention of ever returning to work as an RN, your response is important.

All replies are strictly confidential and will be reported only in the form of statistical summaries in which no individual can be identified. The questionnaires are numbered only so that we will know who has already replied. No further contact will be made once we have received your questionnaire.

Your cooperation in completing the questionnaire will be greatly appreciated. Thank you in advance.

Sincerely,

H. Allan Hunt

H. Allan Hunt
Project Director

HAH/bep
Enc.

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INSTITUTE OF INDUSTRIAL RELATIONS

BERKELEY, CALIFORNIA 94720

July 10, 1973

Dear Registered Nurse,

At the time of this mailing, our records indicate that we have not yet received a response to the questionnaire we sent you in mid June. As you may recall, we are investigating the links between RN education and the RN job market. We are seeking to discover how the positions and compensation of RNs from Diploma, Associate Degree, and Baccalaureate programs differ. That is the reason for this attempt to gather information about the educational and work experiences of a random sample of California Registered Nurses.

The responses are coming in well, but we are concerned that we have not yet heard from you. We need your response to insure that our results truly represent all California RNs. Would you assist us by taking a few minutes to complete the questionnaire at this time? The completed questionnaire requires no postage or envelope to return, just seal and mail. Let me assure you once again that all replies are strictly confidential and will be used only for research purposes.

In case you have misplaced the questionnaire we sent you earlier, we are enclosing another one for your use. If you have already returned a questionnaire, please do not return this one, but simply ignore this letter and accept our apologies for bothering you again.

Thank you for your assistance.

Sincerely,

H. Allan Hunt
Project Director

HAH/bep
Enc.

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INSTITUTE OF INDUSTRIAL RELATIONS

BERKELEY, CALIFORNIA 94720

August 2, 1973

Dear Registered Nurse,

The data gathering phase of our investigation into the connections between RN education and the RN job market is drawing to a close. However, we have decided to make one last appeal for your response.

We are asking about the situations of individual Registered Nurses to gain a better understanding of the way in which different types of RN education are rewarded in the job market. Our hope is that this will be helpful in evaluating the education provided in the various types of programs.

Each individual's response is important to us so that we can be confident that our results truly represent all California RNs. Even if you are no longer associated with nursing, we need your response to help establish the career patterns of Registered Nurses.

If you find there are individual items in the questionnaire you object to, just leave them blank. The completed questionnaire requires no postage or envelope to return, just seal and mail. Let me assure you again that all replies are strictly confidential and will be used only for research purposes.

In case you have already returned the questionnaire, please do not return this one. Just ignore this letter and accept our apology.

Thank you in advance for your assistance.

Sincerely,

H. Allan Hunt

H. Allan Hunt
Project Director

RN EDUCATION AND THE RN JOB MARKET

BEST COPY AVAILABLE

Number 1-4/

5/1

INSTRUCTIONS

Please answer by circling the number to the right of the statement that best answers the question or fill in the blank where appropriate. Please feel free to add comments to clarify or qualify your answers.

1. What type of basic nursing program did you graduate from? 6/

Diploma 1
Associate Degree 2
Baccalaureate 3

2. In what state (or foreign country) was this program located? 7/

_____

3. In what year did you complete your basic program? 8-9/

19 _____

4. How many of the years since you were licensed have you worked as an RN? 10-11/

_____

5. If you were just beginning your nursing education now, which type of basic program would you choose? 12/

Diploma 1
Associate Degree 2
Baccalaureate 3

If you wish to explain your choice, please use the facing page (inside front cover) to do so.

6. What is your highest educational attainment?

Diploma in nursing	1	13/
Associate Degree in nursing	2	
Associate Degree in field other than nursing	3	
Bachelor's Degree in nursing	4	
Bachelor's Degree in field other than nursing	5	
Master's Degree in nursing	6	
Master's Degree in field other than nursing	7	
Other (Please specify) _____	8	

7. Are you currently working toward an academic degree?

Yes .....(GO ON TO 8)..	1	14/
No .....(SKIP TO 10)..	2	

8. What degree are you working for?

Associate Degree in field other than nursing	1	15/
Bachelor's Degree in nursing	2	
Bachelor's Degree in field other than nursing	3	
Master's Degree in nursing	4	
Master's Degree in field other than nursing	5	
Other (Please specify) _____	6	

9. What is your <u>main</u> reason for continuing your education?

	Circle one	
Indicated degree is required for my current position	1	16/
Indicated degree will qualify me for a salary increase	2	
Indicated degree will qualify me for a position I am seeking	3	
Academic work serves as a refresher course to assist in return to nursing	4	
Employer pays fees, nothing to lose	5	
Improve general knowledge or for enjoyment	6	
Other (Please specify) _____	7	

10. Are you currently employed?

Yes, as an RN ..... (SKIP TO 18, PAGE 6)..... 1 17/
Yes, outside nursing 2
(Please specify type of work) _____

_____ (GO ON TO 11)

No .....(GO ON TO 11)..... 3

11. When did you last work regularly as an RN?

19 _____ 18-19/

12. Why did you leave your last nursing job?

	Circle one	
Spouse wanted me to quit	01	20-21/
Spouse transferred, moved	02	
Pregnancy	03	
Own health problems	04	
Health of family members	05	
Lay-off	06	
Unsatisfactory work arrangement ..	07	
Devote more time to family	08	
Return to school	09	
Other (Please specify) _____	10	

_____

13. Are you at all interested in returning to work as an RN in the next few years?

Yes .....(GO ON TO 14)..... 1 22/
No .....(SKIP TO 17)..... 2

14. Would you be interested in full-time or part-time work?

Full-time 1 23/
Part-time 2

15. What field of employment would you be most interested in?

Hospital 01 24-25/
Nursing home/extended care facility 02
Clinic 03
Nursing education 04
Office nursing 05
Private duty nursing 06
School nursing 07
Industrial nursing 08
Public health nursing 09
Other (Please specify) _____ 10

_____

16. What monthly salary do you think you would receive as a general duty nurse if you went back to work in a hospital right now?

$_____ per month 26-29/

17. Below you will find a number of reasons for not currently working as a Registered Nurse. Please indicate at the bottom of the page which of these is most important, second most important and third most important in your own case at this time.

1. My spouse feels I should not work.
2. I have lost interest in nursing as a profession.
3. I would have difficulty with transportation to and from work.
4. The salary I would get is too low.
5. I am reluctant to return to work because the skill requirements for nursing have changed so much since I last worked.
6. I believe I should stay at home with my children while they are young.
7. I prefer to be a homemaker.
8. I cannot make suitable child care arrangements.
9. Child care costs are so high that it does not pay for me to work.
10. My health prevents me from working.
11. I cannot find a job utilizing hours for which I am available.
12. The nursing position I am interested in is not available.
13. I prefer volunteering my time for community activities.
14. I am currently attending school.
15. Other (Please specify) _____

_____

Most important _____ 30-31/

Second most important _____ 32-33/

Third most important _____ 34-35/

SKIP TO QUESTION 34, PAGE 10

IF YOU ARE CURRENTLY EMPLOYED AS AN RN, PLEASE ANSWER THE FOLLOWING QUESTIONS

18. Which of the following best describes your field of employment?

Hospital	01	36-37/
Nursing home/extended care facility	02	
Clinic	03	
Nursing education	04	
Office nursing	05	
Private duty nursing	06	
School nursing	07	
Industrial nursing	08	
Public health nursing	09	
Other (Please specify) _____	10	

19. What type of employer do you work for?

Federal government	1	38/
State government	2	
Local government (county or city)	3	
Private non-profit	4	
Proprietary (for profit)	5	
Self-employed	6	
Other (Please specify) _____	7	

20. In what city or town do you work?

_____ 39-40/

21. How many people work at your place of employment?

Less than 10	1	41/
10-25	2	
26-50	3	
51-100	4	
101-250	5	
251-500	6	
501-750	7	
751-1000	8	
Over 1000	9	

22. How many years have you worked for this employer?

_____ years 42-43/

23. What is your position or job title?

Director of Nursing or Assistant	01	44-45/
Nursing Instructor	02	
Clinical Nurse Specialist	03	
Supervisor or Assistant	04	
Head Nurse or Assistant	05	
Staff (General Duty) Nurse	06	
Private Duty Nurse	07	
Office Nurse	08	
Industrial Nurse	09	
Public Health Nurse	10	
Other (Please specify) _____	11	

_____ _____

24. How many hours are you <u>scheduled</u> to work during a normal work week in your present position?

_____ hours 46-47/

25. What is your current gross salary (before any deductions) on this job?

$ _____ per _____ 48-50/
(Period; e.g week,)
(two weeks, month)

26. How many hours do you actually work during a normal week?

_____ hours 51-52/

27. When you work beyond your regularly scheduled hours for the week, do you receive:

Same amount of time off at another time 1 53/
Straight-time pay for extra hours worked 2
Time-and-a-half for extra hours worked 3
No compensation for extra hours worked 4
Do not work over-time 5
Other (Please specify) _____ 6

_____

28. Does your present gross salary include any shift differential?

Yes ....(GO ON TO 29).... 1 54/
No .....(SKIP TO 30)..... 2

29. What is the shift differential?

$ _____ per _____ 55-56/
(Period; e.g. week,)
(two weeks, month)

30. Is your salary set through a collectively bargained agreement?

Yes	1	57/
No	2	

31. How many days paid vacation (other than holidays) do you receive per year?

_____ days 58-59/

32. How many days paid sick leave do you receive per year?

_____ days 60-61/

33. Which of the following fringe benefits are paid for (in whole or in part) by your employer?

	Yes	No	
Health plan	1	2	62/
Major medical plan	1	2	63/
Dental plan	1	2	64/
Pension plan (other than Social Security)	1	2	65/
Life insurance	1	2	66/

BACKGROUND INFORMATION

34. What is your age? _____ years 67-68/

35. Sex

Female 1 69/
Male 2

36. What county do you live in?
(Give state if not California)

_____ 70-71/

37. How would you rate your health, compared with other people of about your age?

Excellent 1 72/
Good 2
Fair 3
Poor 4

38. Where did you rank academically in your high school graduating class?

Top 5% 1 73/
Top 10% 2
Top quarter 3
Second quarter 4
Third quarter 5
Fourth quarter 6

39. Marital status

Married 1 74/
Divorced/separated ... 2
Widow or widower 3
Never married 4

Number 1-4/

IF MARRIED, PLEASE ANSWER THE FOLLOWING QUESTIONS
OTHERWISE, SKIP TO 42 5/2

40. Is your spouse currently:

Employed full-time	1	6/
Employed part-time	2	
Looking for work	3	
Retired or disabled	4	
Keeping house	5	
Attending school	6	
Other (Please specify)	7	

_____

41. What is your spouse's current gross monthly income (before any deductions)?

$ _____ per month 7-10/

42. Do you have any children living at home?

Yes ....(GO ON TO 43)....	1	11/
No .....(SKIP TO 46).....	2	

43. How many children do you have living at home in each of the following age groups?

Pre-school	____	12/
Grade school (Grades K-6)	____	13/
Junior high (Grades 7-9)	____	14/
High school and above....	____	15/

44. Have you had to make arrangements for child care in order to work?

Yes ....(GO ON TO 45)....	1	16/
No .....(SKIP TO 46).....	2	

45. What is the cost of this child care?

$ _____ per _____ 17-18/
(Period, e.g. week,)
(two weeks, month)

46. Do you (and your spouse if married) receive income from any of the following sources?

	YES	NO	
Social Security	1	2	19/
Private pension or annuity	1	2	20/
V. A. payments	1	2	21/
Rental of property	1	2	22/
Interest or dividends	1	2	23/
Alimony and/or child support ..	1	2	24/
Other (Please specify) _____	1	2	25/

_____

47. What is the rough monthly total of income in all these categories?

$ _____ per month 26-29/

48. This study is aimed at developing some of the connections between RN education and the experiences of RNs on the job market. It is hoped that this will be helpful in evaluating the education provided in the various types of RN education programs. We also would be interested in your thoughts on the differences in job performance among the various types of graduates. If you wish to comment on this issue, please use the inside rear cover to do so.

THANK YOU VERY MUCH FOR YOUR COOPERATION.

TO RETURN, JUST TAPE THE QUESTIONNAIRE SHUT AND DROP THE SEALED QUESTIONNAIRE IN THE MAIL BOX.

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